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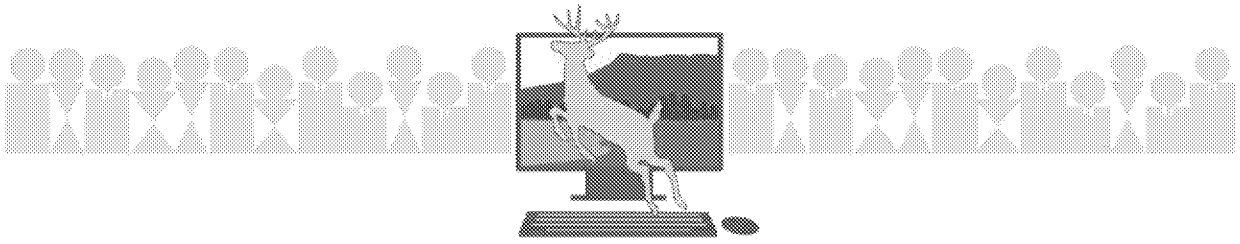

WEST VIRGINIA RESIDENTS' OPINIONS ON AND TOLERANCE LEVELS OF ALGAE IN WEST VIRGINIA WATERS

Conducted for the West Virginia Department of Environmental Protection

by Responsive Management

2012

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EXECUTIVE SUMMARY

INTRODUCTION AND METHODOLOGY

The West Virginia Department of Environmental Protection's (DEP) Water Quality Standards Program is designed to monitor and control water quality in accordance with the Clean Water Act. Water Quality Standards (hereinafter referred to as "Standards") are legal criteria established to control the amount of pollution entering West Virginia waters from multiple sources, including industry, wastewater treatment facilities, and runoff.

As part of the agency's efforts to develop Standards regarding algae in streams and waterways in West Virginia, this study was conducted for the DEP to identify the public's threshold for algae and to assess the impact of algae levels on pubic recreational water use, such as swimming, fishing, and boating. The study entailed a statewide telephone survey of West Virginia residents.

A portion of this study entailed assessing respondents' reactions to images of seven levels of algae cover on West Virginia waters to determine the public's threshold for algae (see Appendix A for the images used in this study). Each aquatic image depicts a different level of algae cover on a different West Virginia body of water. The level of algae cover for each image used in the study was assessed and determined by the DEP.

The survey design required the respondents to have the images in front of them for reference on specific questions while they were being interviewed. Respondents were first called to secure their participation; if they agreed to participate, they were supplied with the images via postal mail or via the Internet, according to their preference. Each respondent could view the images online or receive a printed packet of the images. Those who could access the images online while on the telephone were directed to a website address for the images and were asked to complete the survey during the initial call. Those who could not access the images online while on the telephone (or who preferred to look at paper images) were either e-mailed the website address to access the images online at another time or were mailed a printed packet, and then they were called to complete the survey at a subsequent date. Those who received the printed packet in the mail but who did not have it readily available when they were called to complete the survey were again encouraged to view the images online, if possible, and were provided the

website address for the images. Alternately, a call-back was scheduled for a time when they would have the images available.

In the image portion of the survey, respondents were assigned a random aquatic image as a starting point with the quantity and order of subsequent images based on their responses to each question throughout the image portion of the survey. Specifically, respondents were presented an image of algae cover and asked if it was acceptable or unacceptable. If it was deemed acceptable, respondents were directed to the next highest level of algae cover and asked about its acceptability, moving on up until they found the level that was unacceptable (or until the highest level was reached). Conversely, if they found the first photograph to which they were directed unacceptable, they moved down in algae coverage levels until they found the level that was acceptable (or until the lowest level was reached). In this way, the survey recorded the highest level of algae cover that respondents felt was acceptable.

The telephone survey questionnaire was developed cooperatively by Responsive Management and the DEP, based on the research team's familiarity with natural resource management, water quality, and outdoor recreation. The sample was representative of all West Virginia residents. A central polling site at the Responsive Management office allowed for rigorous quality control over the interviews and data collection. Telephone surveying times are Monday through Friday from 9:00 a.m. to 9:00 p.m., Saturday from noon to 5:00 p.m., and Sunday from 5:00 p.m. to 9:00 p.m., local time. The survey was conducted in February and March 2012.

The software used for data collection was Questionnaire Programming Language. Responsive Management obtained a total of 1,001 completed interviews. The analysis of data was performed using Statistical Package for the Social Sciences as well as proprietary software developed by Responsive Management. Throughout this report, findings of the telephone survey are reported at a 95% confidence interval (or higher). For the entire sample of West Virginia residents, the sampling error is at most plus or minus 3.10 percentage points.

PARTICIPATION IN WATER ACTIVITIES

Many West Virginia residents participate in water-based recreation, which means that there is likely to be wide exposure to algae issues. In particular, rivers and streams are commonly used, with somewhat less use being made of lakes/reservoirs, and much less use being made of ponds. The three rivers of interest (the Greenbrier, the South Branch of the Potomac, and the Cacapon, chosen for focus in the study because of the prevalence of algae issues on them) are widely used: about a third of water-based recreationists (32%) used one or more of these rivers for recreation.

KNOWLEDGE OF AND RATINGS OF THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Perceptions of credibility and trustworthiness of the DEP are positive, with only 4% saying that the DEP is *not at all* credible and 4% saying that the DEP is *not at all* trustworthy; however, the ratings are not uniformly positive, with substantial percentages saying that the DEP is *somewhat* credible (36%) or *somewhat* trustworthy (40%). Ratings of the DEP's efforts at protecting and restoring the environment are positive: 70% rate the efforts as excellent or good. Finally, in general, residents want the DEP to expend more effort on protecting and restoring the environment. In general, this suggests that the DEP will have credibility among residents regarding any communications relating to algae in West Virginia waters.

KNOWLEDGE AND AWARENESS OF ALGAE

In general, while West Virginia resident do not profess much knowledge of algae, they are aware of algae in West Virginia waters. About a third of residents (32%) think that algae has been increasing in West Virginia waters over the past 2 years. This perception of increasing algae levels is particularly strong among those who participate in water-based recreation on one of the three rivers of interest in this study (42% of those recreationists say that algae has been increasing over the past 2 years).

OPINIONS ON ALGAE IN GENERAL

General opinions of algae run from some mild concern ("Algae doesn't bother me, but I worry about problems it may cause") to more robust concern ("I generally regard algae as a nuisance"). When asked directly about whether algae is a problem in West Virginia, more than a third of

residents indicate that algae is a problem. Furthermore, about a quarter indicate being concerned about algae in West Virginia waters.

A series of questions elicited opinions on various aspects of algae. Aesthetics plays a major role in feelings about algae, with 79% of West Virginia residents agreeing with the statement, "Algae is generally unattractive and unappealing." Safety also plays a role in opinions about algae, with well more than half of West Virginia residents (57%) agreeing that "algae causes safety hazards for people participating in activities on or in West Virginia waters." Those who participate in water-based recreation on the three rivers of interest have more negative opinions regarding algae, compared to those who do not engage in recreation on these rivers. The above should not be taken to mean that West Virginia residents misunderstand that some amount of algae in natural waters is part of a "normal" ecosystem. A large majority of residents (79%) agree that "algae is beneficial for the ecosystem in some situations."

LEVELS OF ACCEPTANCE OF ALGAE

The primary focus of the survey was to help determine the level of tolerance West Virginia residents have regarding algae in the state's natural waters. As discussed in the methodology, respondents examined photographs that showed varying levels of algae cover to determine at which point the level becomes unacceptable to them. The photograph that shows 20 percent coverage has only about a quarter of respondents (27%) thinking that this amount is unacceptable. However, the next photograph, showing 26 percent coverage, has nearly half of respondents (49%) thinking that the level is unacceptable. This suggests that waters with any more than a quarter coverage will be unacceptable to a majority of residents.

Crosstabulations of tolerance levels by participation in various activities and by demographic factors found that certain groups are less tolerant of algae than are other groups. In particular, people who go rafting or inner tubing, power boaters and users of personal watercraft, and those who engage in walking along the banks and shores of natural waters are less tolerant of algae than are their counterparts. Demographically, those who are the median age or older have less tolerance of algae than do younger residents. Additionally, females have less tolerance of algae than do males.

CONTACTING AGENCIES AND ORGANIZATIONS REGARDING ALGAE

The substantial concern expressed about algae is not reflected in contacts with the DEP or other organizations about algae. The survey found that less than 1% of West Virginia residents contacted the DEP about algae in West Virginia waters in the past 2 years, and a little less than 3% contacted any other agency or organization about algae.

ALGAE-RELATED CONSTRAINTS TO PARTICIPATION IN WATER-BASED ACTIVITIES IN WEST VIRGINIA

At present, algae is not a major constraint to water-based recreation in the state. A general open-ended question asked respondents if there were things that took away from their participation in or their enjoyment of water-based recreation in West Virginia, and water quality was named by only 4%, and less than 1% named algae specifically. Nonetheless, if algae levels increase, the data suggest that water-based recreation could be affected. This would be particularly true if algae levels routinely reach more than about a quarter coverage in rivers and streams.

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INTRODUCTION AND METHODOLOGY

The West Virginia Department of Environmental Protection's (DEP) Water Quality Standards Program is designed to monitor and control water quality in accordance with the Clean Water Act. Water Quality Standards (hereinafter referred to as "Standards") are legal criteria established to control the amount of pollution entering West Virginia waters from multiple sources, including industry, wastewater treatment facilities, and runoff. Standards have both numeric and narrative limits and are developed to protect and maintain water quality for the designated or assigned uses, such as aquatic life, water contact recreation, water supply, power generation, agriculture, navigation, and more.

As part of the agency's efforts to develop Standards regarding algae in streams and waterways in West Virginia, this study was conducted for the DEP to identify the public's threshold for algae and to assess the impact of algae levels on pubic recreational water use, such as swimming, fishing, and boating. The study entailed a statewide telephone survey of West Virginia residents. Specific aspects of the research methodology are discussed below.

OVERALL STUDY DESIGN

A portion of this study entailed assessing respondents' reactions to images of seven levels of algae cover on West Virginia waters to determine the public's threshold for algae (see Appendix A for the images used in this study). The survey design required the respondents to have the images in front of them for reference on specific questions. Respondents were first called to secure their participation; if they agreed to participate, they were supplied with the images. Each respondent could view the images online or receive a printed packet of the images. Those who could access the images online while on the telephone were directed to a website address for the images and were asked to complete the survey during the initial call. Those who could not access the images online while on the telephone (or who preferred to look at paper images) were either e-mailed the website address to access the images online at another time or were mailed a printed packet, and then they were called to complete the survey at a subsequent date. Those who received the printed packet in the mail but who did not have it readily available when they were called to complete the survey were again encouraged to view the images online, if possible,

and were provided the website address for the images. Alternately, a call-back was scheduled for a time when they would have the images available.

In addition to the seven images depicting different levels of algae cover on West Virginia waters, five non-aquatic images of wildlife species and various habitats were also included to reduce any potential bias that predisposing respondents to images only of water and algae cover prior to participating in the survey may have produced. The same seven aquatic algae cover images and five non-aquatic images were used online and in each printed packet.

Each aquatic image depicts a different level of algae cover on a different West Virginia body of water. The level of algae cover for each image used in the study was assessed and determined by the DEP. The seven levels of algae cover depicted in the images are 4 percent, 15 percent, 20 percent, 26 percent, 39 percent, 47 percent, and 65 percent cover. Respondents were not informed of the percentage of algae cover depicted in each aquatic image. Although each printed packet and the website featured the aquatic images in the same order, the images were not featured in a logical order; that is, the order did not represent a linear increase in algae cover or a logical progression based on any other factor within the images, and the order was intended to appear random to the respondent.

Each image (aquatic and non-aquatic) was assigned an alphanumeric code by the researchers to enable the interviewer to direct the respondent to a specific image during survey administration and to ensure respondents were answering each question about the correct image. Images were displayed one per page both online and in the printed packet. The tabulation on the following page shows each image code, description, and algae level (if applicable) in the order in which the images appeared in the printed packet as well as the order in which the links to each image were displayed on the website menu (see Appendix B for an image of the primary website menu for this study). A second tabulation on the next page shows only the aquatic images asked about in the survey in order of increasing algae cover.

All Images (Aquatic and Non-Aquatic) in Order of Display

Image Code	Image Description	Algae Cover Level (aquatic images only)
A 12	Wildflowers in West Virginia	
B 83	West Virginia water body with algae cover	20%
D 96	West Virginia water body with algae cover	47%
E 45	Black bear in West Virginia forest fire area	
H 85	West Virginia water body with algae cover	39%
I 74	Fawn (white-tailed deer) in West Virginia	
K 97	West Virginia water body with algae cover	65%
M 51	West Virginia water body with algae cover	4%
O 36	Eastern cottontail rabbit in West Virginia	
Q 52	West Virginia water body with algae cover	15%
U 27	Hardwood trees in West Virginia	
Z 34	West Virginia water body with algae cover	26%

Aquatic Images in Order of Increasing Algae Cover Level

Image Code	Image Description
M 51	West Virginia water body with 4% algae cover
Q 52	West Virginia water body with 15% algae cover
B 83	West Virginia water body with 20% algae cover
Z 34	West Virginia water body with 26% algae cover
H 85	West Virginia water body with 39% algae cover
D 96	West Virginia water body with 47% algae cover
K 97	West Virginia water body with 65% algae cover

Note that respondents were not directed to the images in the order in which they were featured in the online menu or the printed packet. Respondents were assigned a random aquatic image as a starting point with the quantity and order of subsequent images based on their responses to each question throughout the image portion of the survey. Respondents were presented an image of algae cover and asked if it was acceptable or unacceptable. If it was deemed acceptable, respondents were directed to the next highest level of algae cover and asked about its acceptability, moving on up until they found the level that was unacceptable (or until the highest level was reached). Conversely, if they found the first photograph to which they were directed unacceptable, they moved down in algae coverage levels until they found the level that was acceptable (or until the lowest level was reached). In this way, the survey recorded the highest level of algae cover that respondents felt was acceptable.

QUESTIONNAIRE DESIGN

The telephone survey questionnaire was developed cooperatively by Responsive Management and the DEP, based on the research team's familiarity with natural resource management, water quality, and outdoor recreation. Responsive Management conducted pre-tests of the questionnaire to ensure proper wording, flow, and logic in the survey.

SURVEY SAMPLE

The sample of West Virginia residents was obtained from Survey Sampling International and Database 101, providers of scientific samples of populations. The sample was representative of all West Virginia residents 18 years old and older.

TELEPHONE INTERVIEWING FACILITIES

A central polling site at the Responsive Management office allowed for rigorous quality control over the interviews and data collection. Responsive Management maintains its own in-house telephone interviewing facilities. These facilities are staffed by interviewers with experience conducting computer-assisted telephone interviews on the subjects of outdoor recreation and natural resources.

To ensure the integrity of the telephone survey data, Responsive Management has interviewers who have been trained according to the standards established by the Council of American Survey Research Organizations. Methods of instruction included lecture and role-playing. The Survey Center Managers and other professional staff conducted a project briefing with the interviewers prior to the administration of this survey. Interviewers were instructed on type of study, study goals and objectives, handling of survey questions, interview length, termination points and qualifiers for participation, interviewer instructions within the survey questionnaire, reading of the survey questions, skip patterns, and probing and clarifying techniques necessary for specific questions on the survey questionnaire.

INTERVIEWING DATES AND TIMES

Telephone surveying times are Monday through Friday from 9:00 a.m. to 9:00 p.m., Saturday from noon to 5:00 p.m., and Sunday from 5:00 p.m. to 9:00 p.m., local time. A five-callback

design was used to maintain the representativeness of the sample, to avoid bias toward people easy to reach by telephone, and to provide an equal opportunity for all to participate. When a respondent could not be reached on the first call, subsequent calls were placed on different days of the week and at different times of the day. The survey was conducted in February and March 2012.

TELEPHONE SURVEY DATA COLLECTION AND QUALITY CONTROL

The software used for data collection was Questionnaire Programming Language (QPL). The survey data were entered into the computer as each interview was being conducted, eliminating manual data entry after the completion of the survey and the concomitant data entry errors that may occur with manual data entry. The survey questionnaire was programmed so that QPL branched, coded, and substituted phrases in the survey based on previous responses to ensure the integrity and consistency of the data collection.

The Survey Center Managers and statisticians monitored the data collection, including monitoring of the actual telephone interviews without the interviewers' knowledge, to evaluate the performance of each interviewer and ensure the integrity of the data. The survey questionnaire itself contains error checkers and computation statements to ensure quality and consistent data. After the surveys were obtained by the interviewers, the Survey Center Managers and/or statisticians checked each completed survey to ensure clarity and completeness.

Responsive Management obtained a total of 1,001 completed interviews. The total sample size on some questions is less than 1,001 because the survey asked some questions only of specific respondents in the survey. In particular, this was done when a follow-up question did not apply to some respondents. For instance, only those who participated in activities on or in West Virginia waters were asked follow-up questions about the specific bodies of water in which they participated in recreation.

DATA ANALYSIS

The analysis of data was performed using Statistical Package for the Social Sciences as well as proprietary software developed by Responsive Management. The results were weighted by demographic characteristics so that the sample was representative of residents in West Virginia as a whole.

On questions that asked respondents to provide a number (e.g., age), the graph shows ranges of numbers rather than the precise numbers. Nonetheless, in the survey each respondent provided a precise number, and the dataset includes this precise number, even if the graph only shows ranges of numbers. Note that the calculation of means and medians used the precise numbers that the respondents provided.

Crosstabulations were run on many questions, including crosstabulations by participation in water-based recreation on three rivers of interest, chosen because of the prevalence of algae issues in the past on those rivers: the Greenbrier, the South Branch of the Potomac, and the Cacapon. Other crosstabulations were run, as appropriate, as part of the analysis. These crosstabulations are indicated on the graphs.

SAMPLING ERROR

Throughout this report, findings of the telephone survey are reported at a 95% confidence interval (or higher). For the entire sample of West Virginia residents, the sampling error is at most plus or minus 3.10 percentage points. This means that if the survey were conducted 100 times on different samples that were selected in the same way, the findings of 95 out of the 100 surveys would fall within plus or minus 3.10 percentage points of each other. Sampling error was calculated using the formula described on the following page, with a sample size of 1,001 and a population size of 1,465,576 residents 18 years old and older.

Sampling Error Equation

$$B = \left(\sqrt{\frac{\frac{N_P(.25)}{N_s} - .25}{N_P - 1}} \right) (1.96)$$

Where: B = maximum sampling error (as decimal)
N_P = population size (i.e., total number who could be surveyed)
N_S = sample size (i.e., total number of respondents surveyed)

Derived from formula: p. 206 in Dillman, D. A. 2000. *Mail and Internet Surveys*. John Wiley & Sons, NY.

Note: This is a simplified version of the formula that calculates the maximum sampling error using a 50:50 split (the most conservative calculation because a 50:50 split would give maximum variation).

ADDITIONAL INFORMATION ABOUT THE PRESENTATION OF RESULTS IN THE REPORT

In examining the results, it is important to be aware that the questionnaire included several types of questions:

- Open-ended questions are those in which no answer set is read to the respondents; rather, they can respond with anything that comes to mind from the question.
- Closed-ended questions have an answer set from which to choose.
- Single or multiple response questions: Some questions allow only a single response, while other questions allow respondents to give more than one response or choose all that apply. Those that allow more than a single response are indicated on the graphs with the label, "Multiple Responses Allowed."
- Scaled questions: Many closed-ended questions (but not all) are in a scale, such as excellent-good-fair-poor.
- Series questions: Many questions are part of a series, and the results are primarily intended to be examined relative to the other questions in that series (although results of the questions individually can also be valuable). Typically, results of all questions in a series are shown together.

Some graphs show an average, either the mean or median (or both). The mean is simply the sum of all numbers divided by the number of respondents. Because outliers (extremely high or low numbers relative to most of the other responses) may skew the mean, the median may be shown. The median is the number at which half the sample is above and the other half is below. In other words, a median of 150 means that half the sample gave an answer of more than 150 and the other half gave an answer of less than 150.

Most graphs show results rounded to the nearest integer; however, all data are stored in decimal format, and all calculations are performed on unrounded numbers. For this reason, some results may not sum to exactly 100% because of this rounding on the graphs. Additionally, rounding may cause apparent discrepancies of 1 percentage point between the graphs and the reported results of combined responses (e.g., when "strongly agree" and "moderately agree" are summed to determine the total percentage in agreement).

PARTICIPATION IN WATER ACTIVITIES

- A large majority of West Virginia residents participated, in the past 2 years, in walking along water banks or shores (79%), a majority went swimming in West Virginia waters (55%), and a majority engaged in fishing activities (52%). Considering all boating activities together, 44% did a boating activity. Note that this question's response set was read to respondents, and they were asked if they did or did not do each one; 14% had done none of the activities.
  - The survey followed up the above question by asking if there were other water-based activities that respondents did that were not covered in the first question. A low percentage (less than 3%) indicated that they participated in other water-based activities, including other miscellaneous waterside activities, other in-water activities, camping by the water, conservation activities, and picnicking by the water.
  - Another follow-up question asked respondents to name the single activity in which they participated most often in the past 2 years. The leading activities are fishing (32%) and walking along a water bank or shore (29%), distantly followed by swimming or wading (12%), and various boating activities (all at 6% or less).

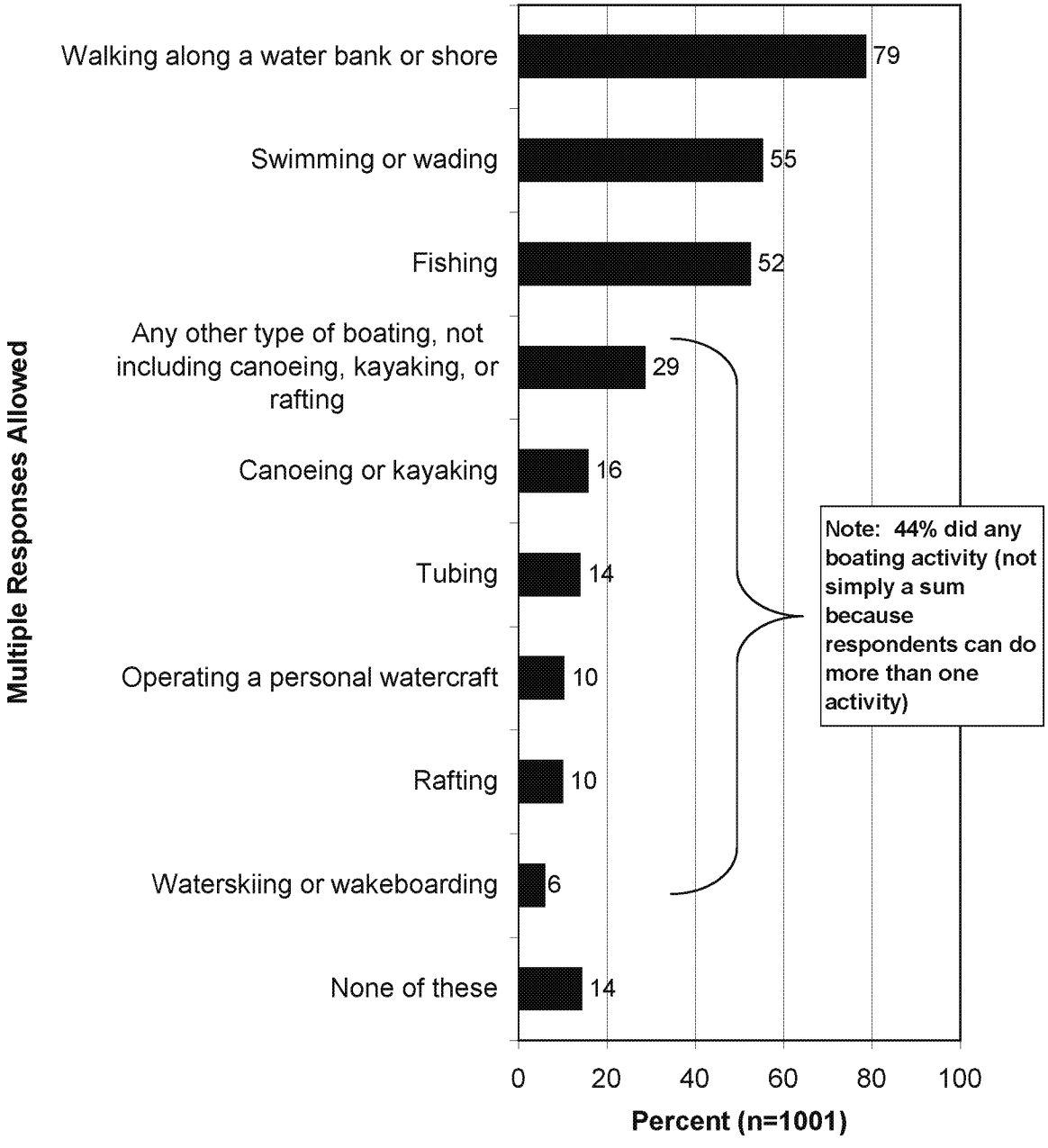
- Two questions asked about employment related to West Virginia waters: a little more than 1% of respondents said that they or members of their household work as outfitters or guides on or associated with West Virginia waters, and 3% said that they or household members work in any other position associated with West Virginia waters.

- Those who had participated in at least one activity on or in West Virginia waters in the past 2 years were asked to name the types of water bodies on or in which they had participated. Rivers and streams were most popular (80% of those who participated in an activity), followed by lakes and reservoirs (48%), and ponds (22%).
  - An additional locational question asked respondents (those who had participated in water-based recreation) if they had participated in any of the water-based activities on any of the three rivers that were chosen for this study: 16% of these respondents had participated on or in the Greenbrier River, 14% on or in the South Branch of the Potomac, and 6% on or in the Cacapon River. In total, 32% of these respondents had

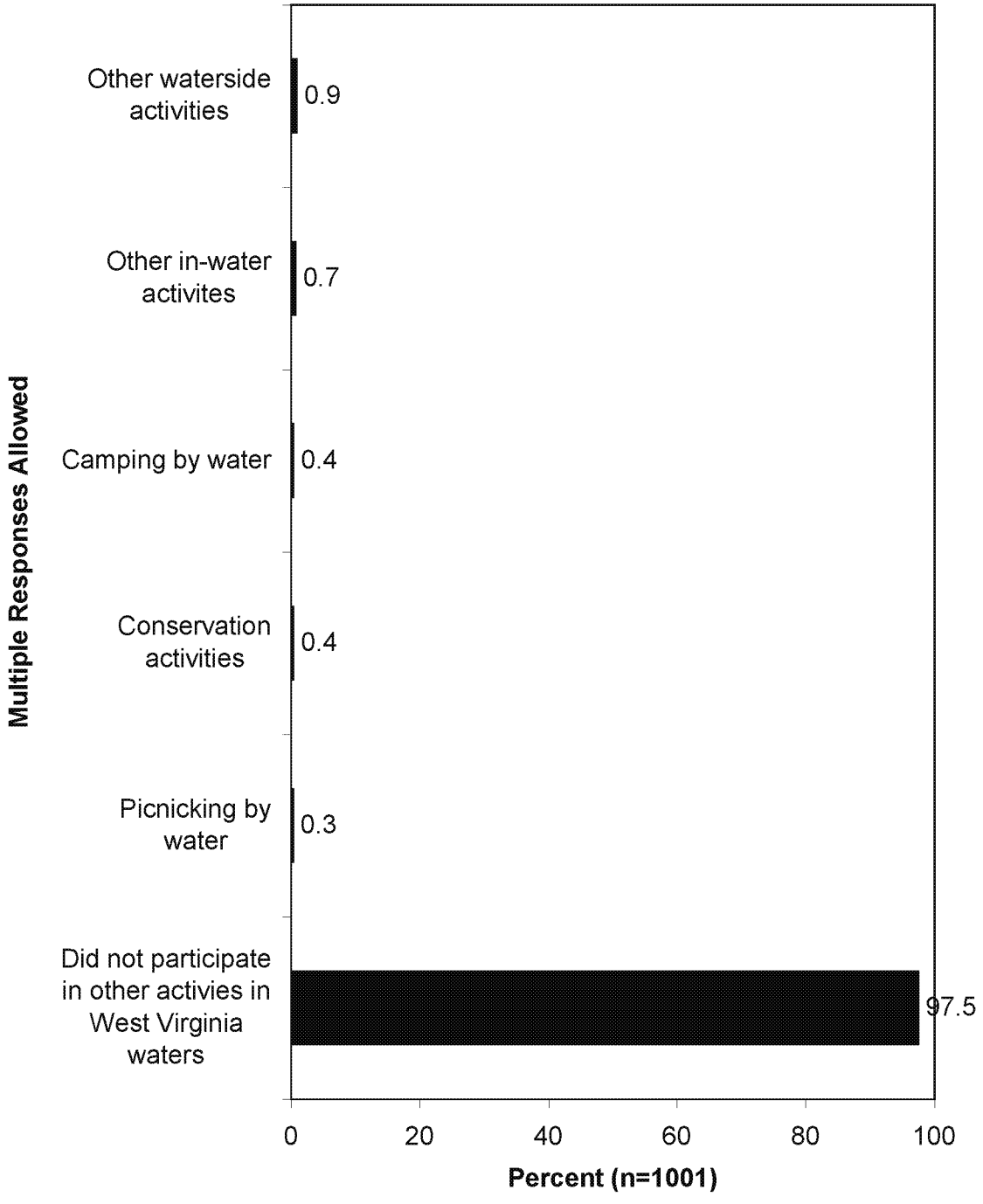
participated in at least one of these three; conversely, 68% had participated in water-based recreation but not on any of these three rivers.

- Another question in this section asked respondents about their likelihood to participate in water-based recreation on or in West Virginia waters in the next 2 years: 77% indicated being likely to do so, mostly *very* likely (60%), while 22% indicated being unlikely.

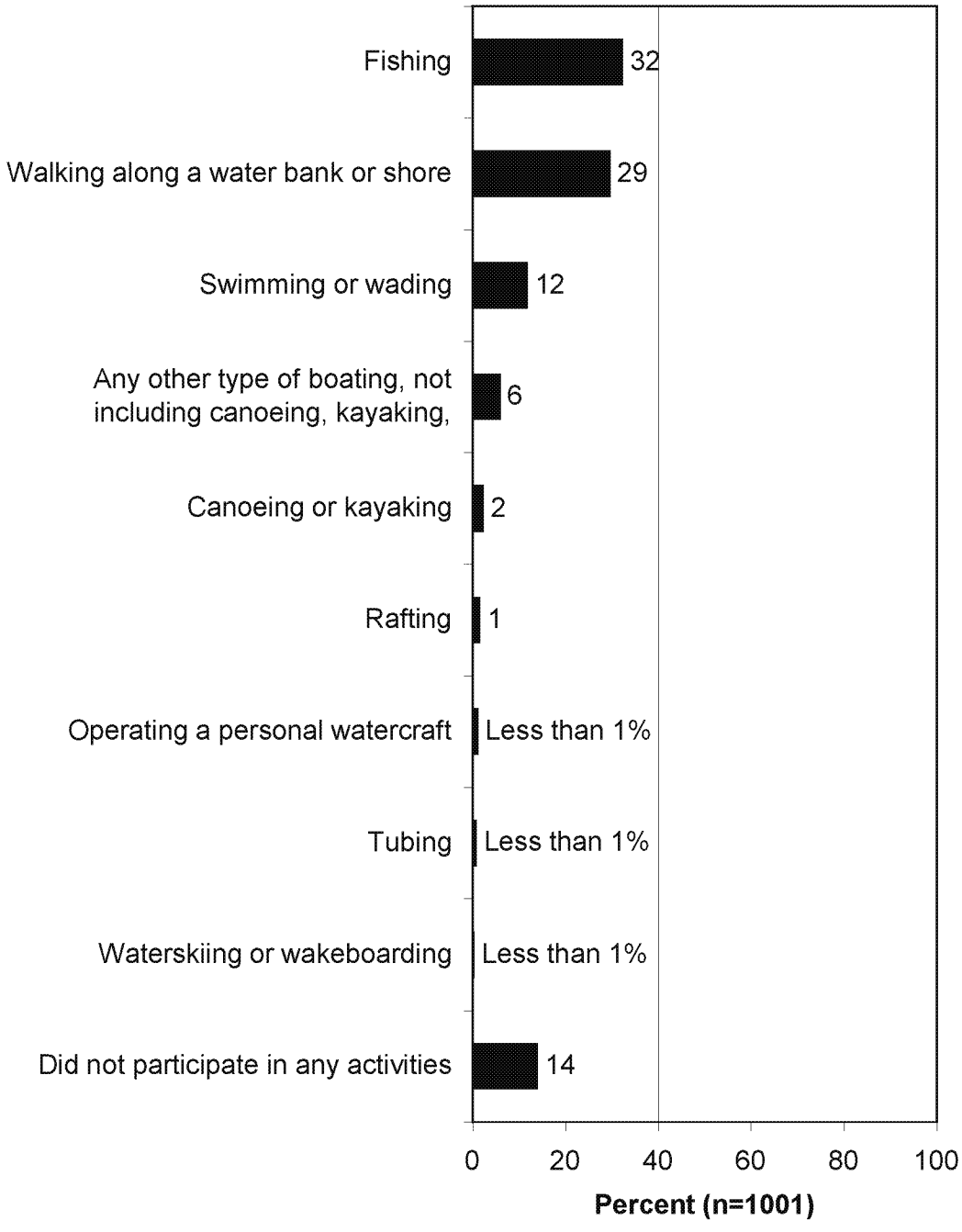
Q22. I would like to know if you personally participated in any of the following activities on or in West Virginia waters, including rivers and streams, lakes and reservoirs, and ponds, in the past 2 years.



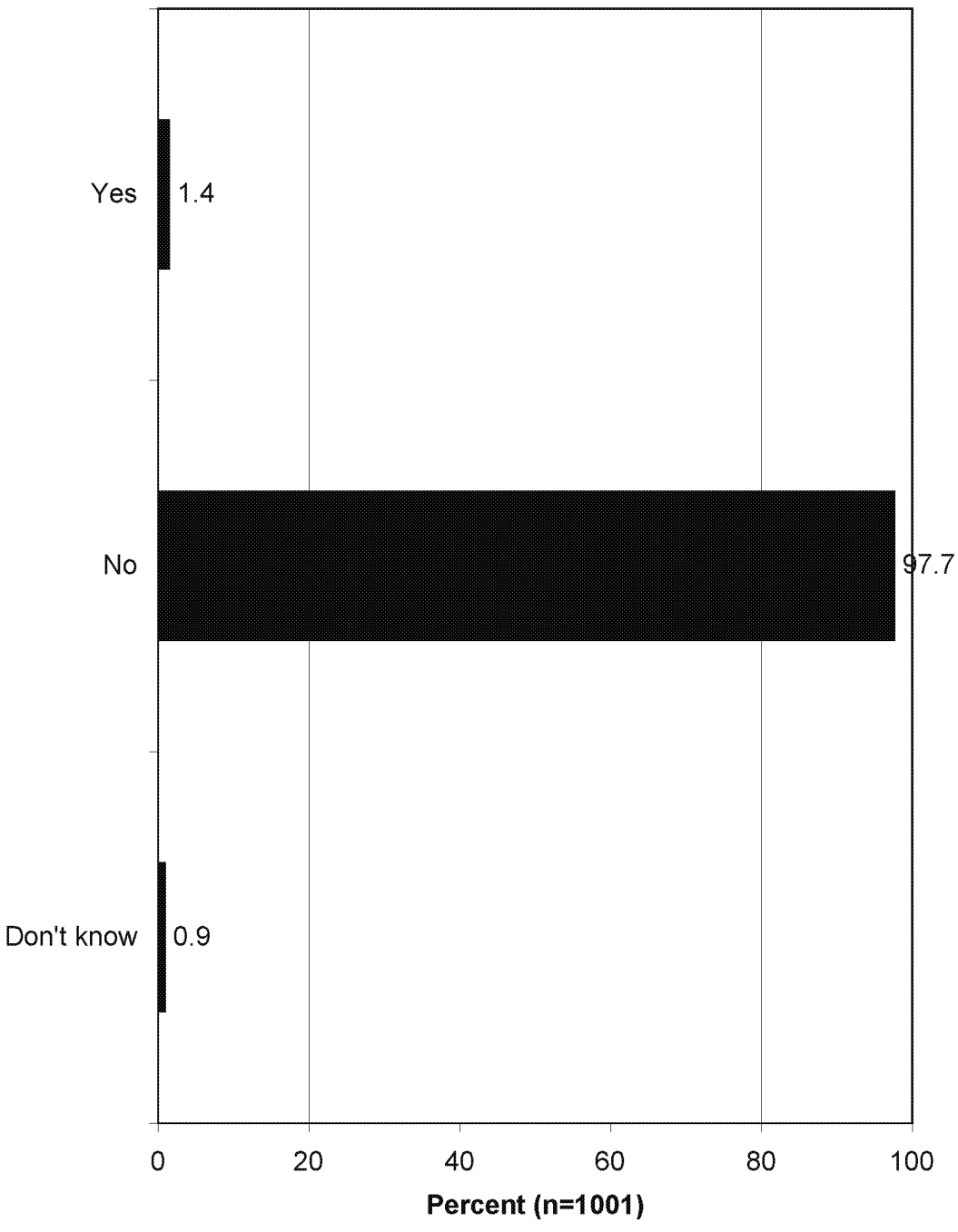
Q24. What other activities did you participate in?



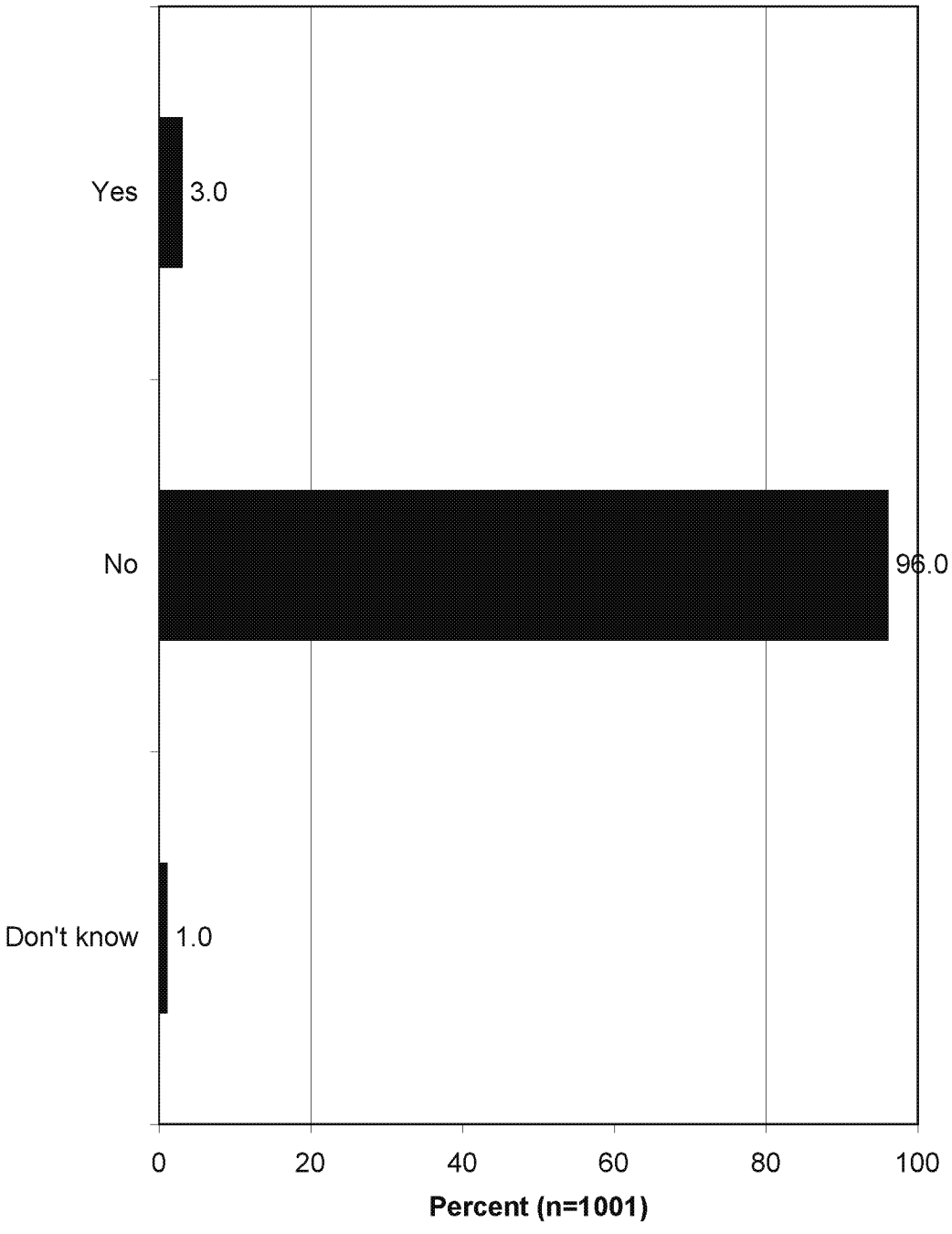
Q26. Which one of these activities did you participate in most often on or in West Virginia waters in the past 2 years?



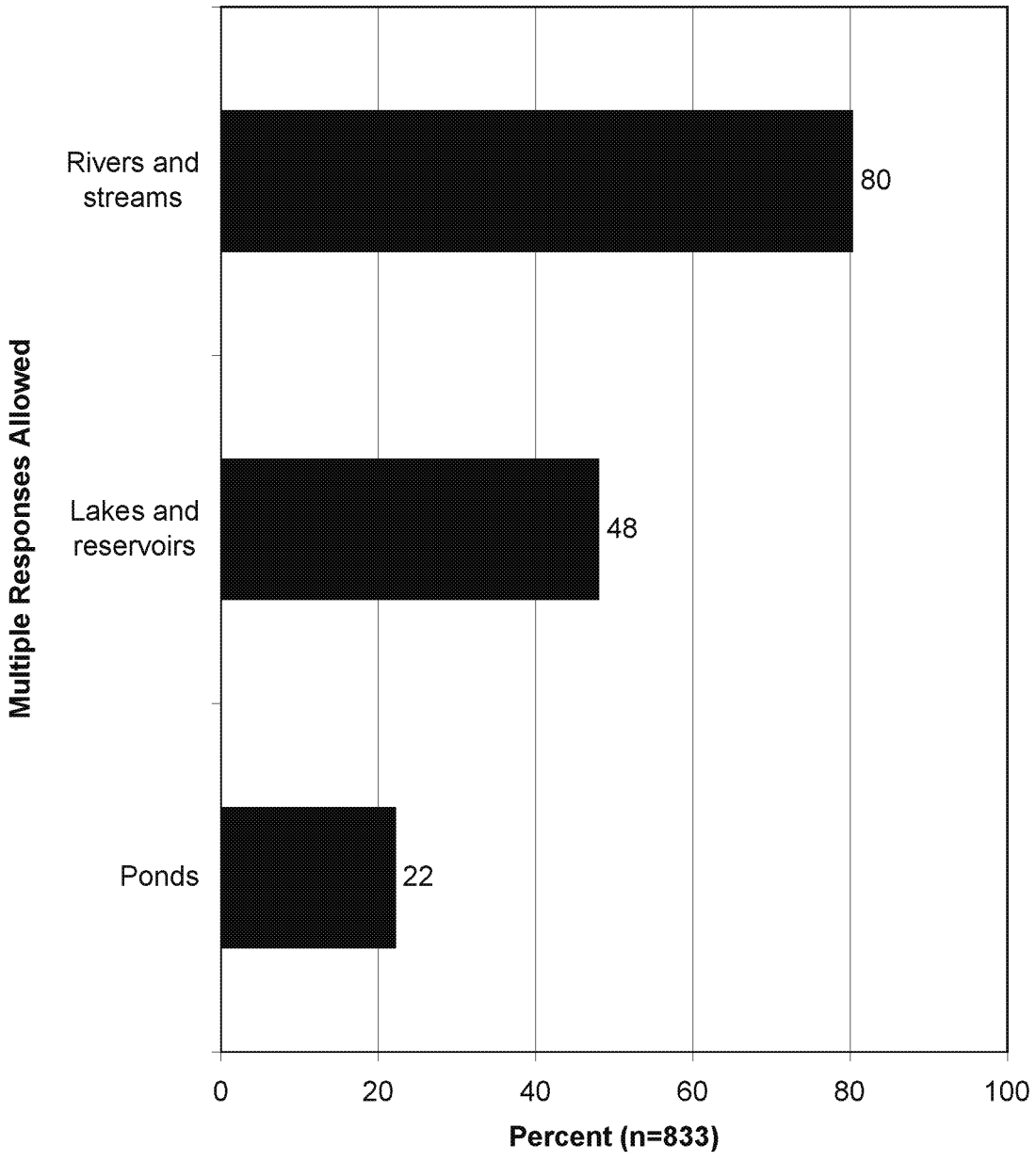
Q100. Do you or does anyone in your household currently work as an outfitter or guide on or associated with West Virginia waters?



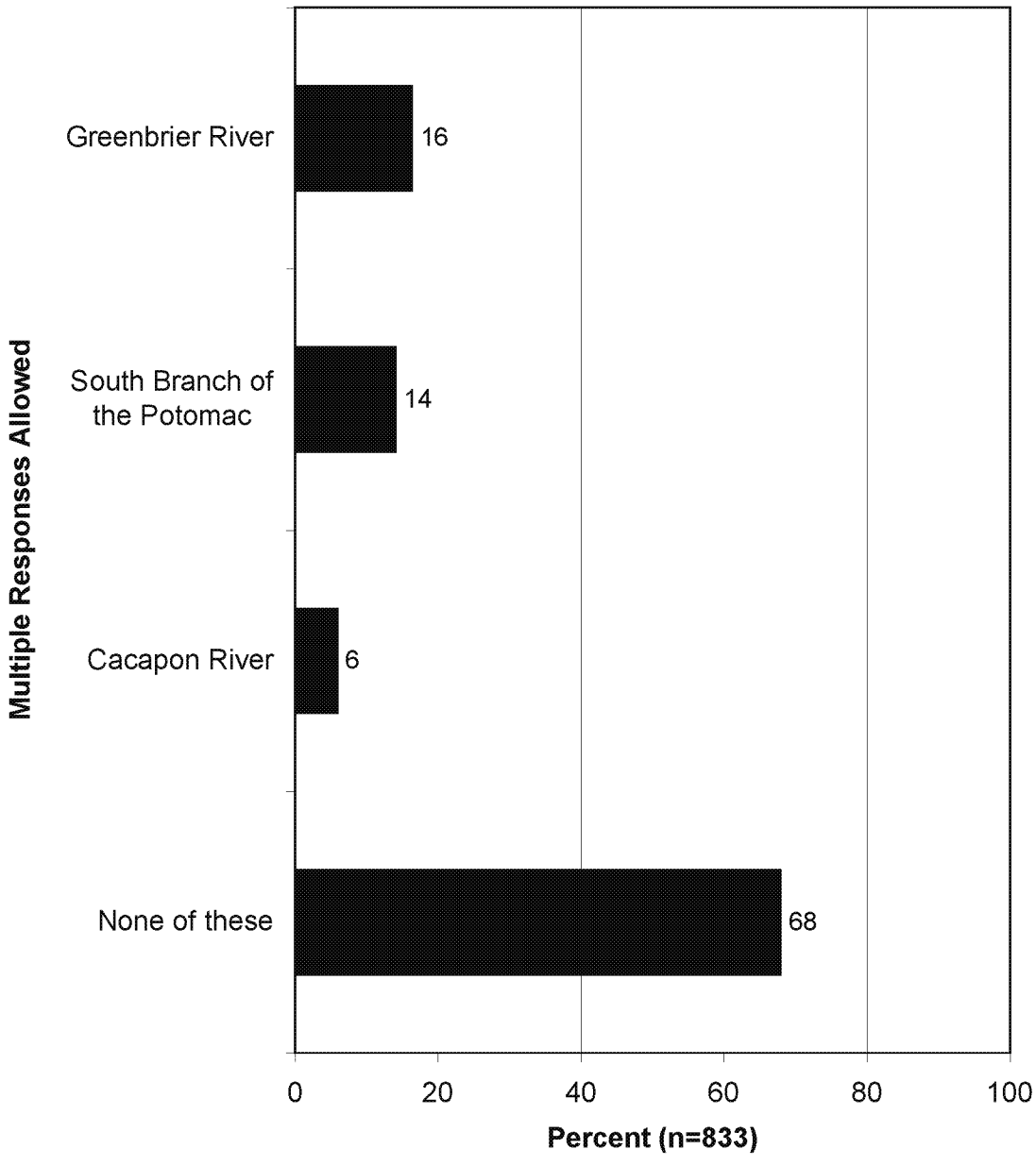
Q101. Do you or does anyone else in your household currently work in any other position on or associated with West Virginia waters?



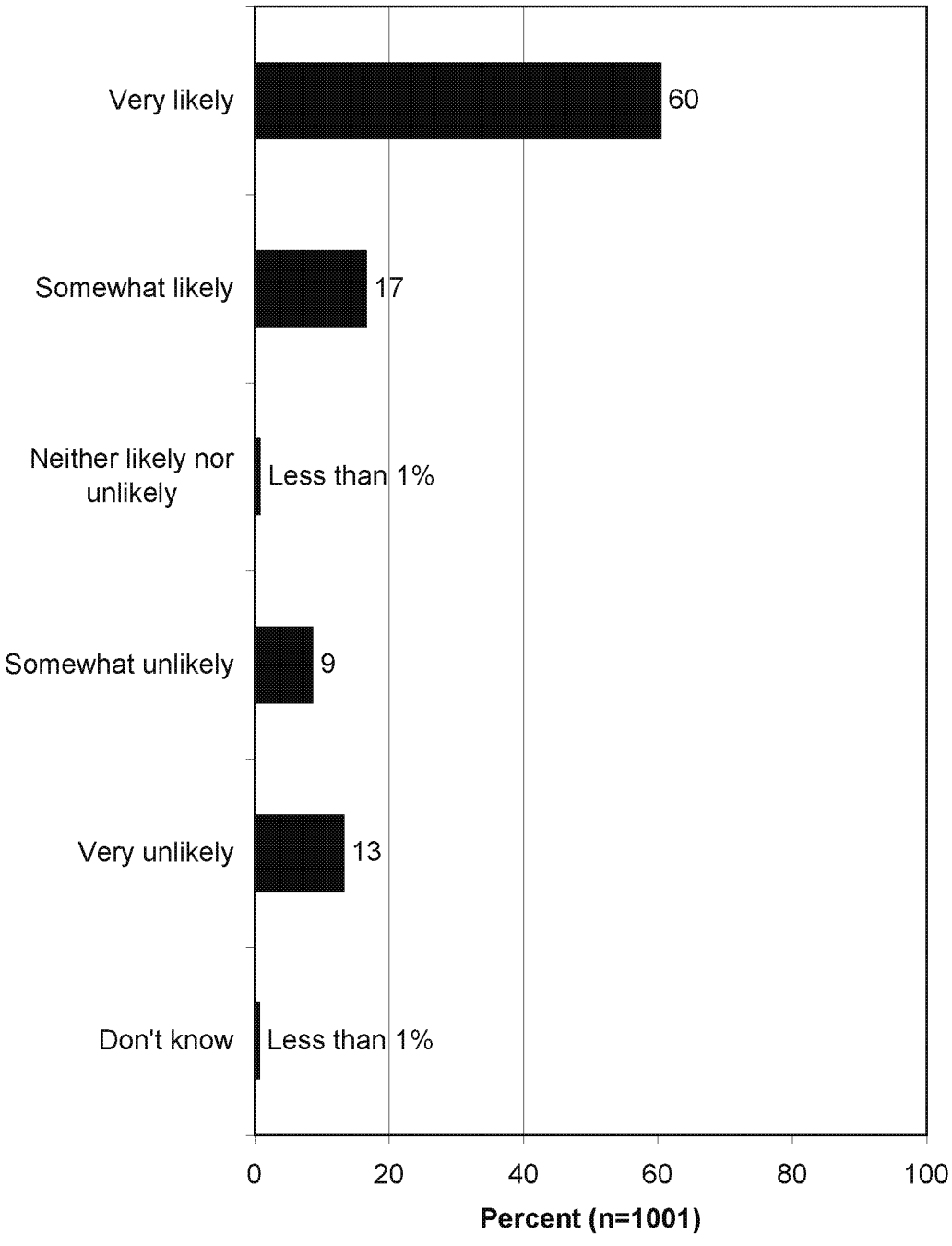
Q30. In which of the following types of water bodies did you participate in these activities in West Virginia? (Asked of those who participated in at least one activity on or in West Virginia waters in the past 2 years.)



Q33. In the past 2 years, did you participate in any activities during the Summer on or in the following water bodies? (Asked of those who participated in at least one activity on or in West Virginia waters in the past 2 years.)



Q42. How likely or unlikely are you to participate in activities on or in West Virginia waters in the next 2 years?



KNOWLEDGE OF AND RATINGS OF THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

- Self-professed knowledge levels of the DEP are relatively low: the majority of respondents are in the bottom half of the knowledge scale, with 58% saying that they know only *a little* and 15% saying that they know *nothing* (a sum of 73% with no more than a little knowledge).

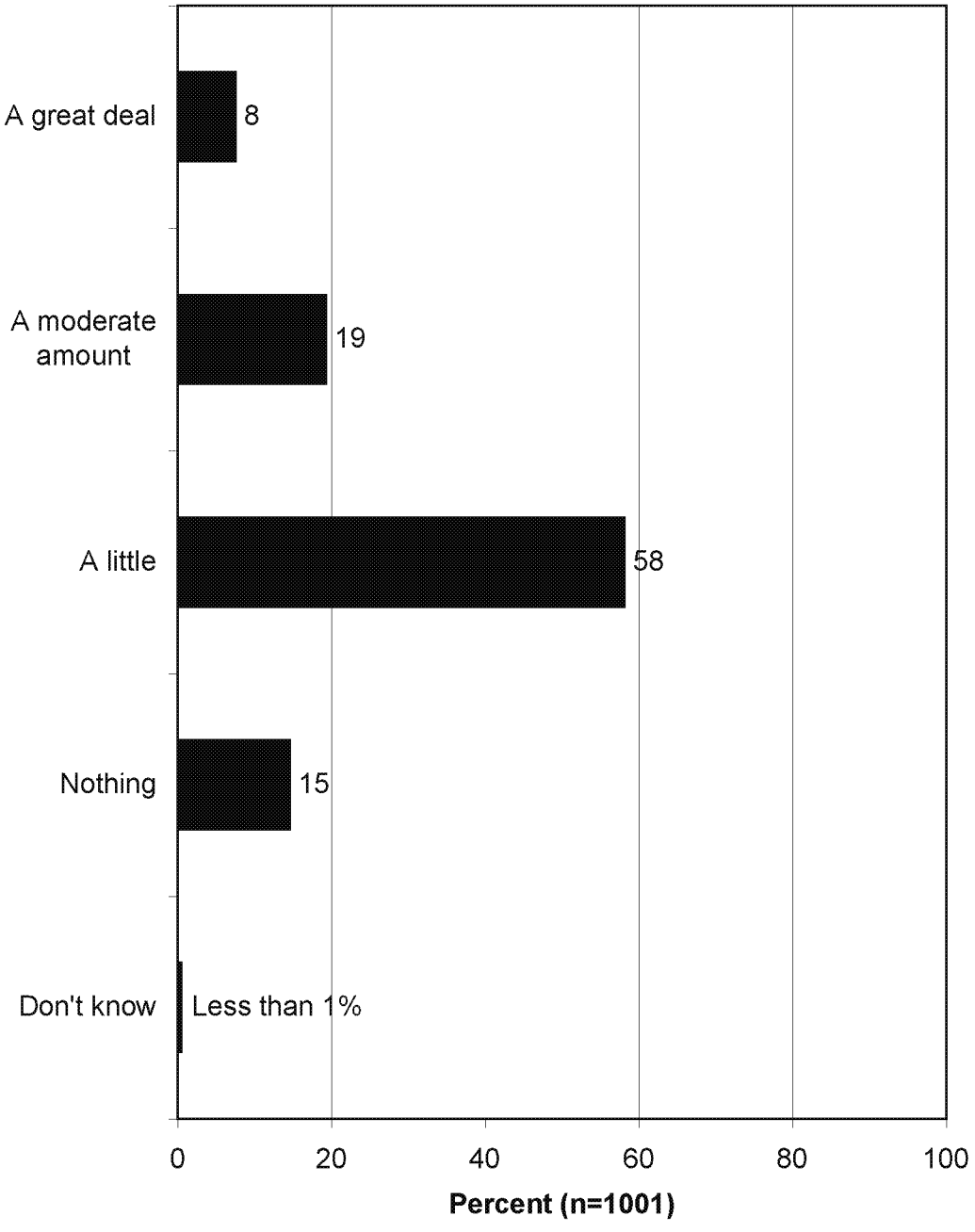
- The survey asked about the credibility of the DEP. Just under half rate the agency as *very* credible (49%), and another 36% rate it as *somewhat* credible (a sum of 85%); at the other end, 4% rate it as *not at all* credible. The remainder say that they do not know.
  - A similar question asked respondents to rate how trustworthy the agency is: 43% say *very* trustworthy, 40% say *somewhat* trustworthy (a sum of 83%), and 4% rate it *not at all* trustworthy.

- The questions about credibility and trustworthiness were crosstabulated by self-professed knowledge of the agency. In general, those at higher self-professed knowledge levels are less likely to answer don't know to either of these questions, compared to those with lower self-professed knowledge levels. Because of this, respondents at higher knowledge levels are more likely to say that the agency is *very* credible or *very* trustworthy, but also more likely to say that the agency is *not at all* credible or trustworthy.

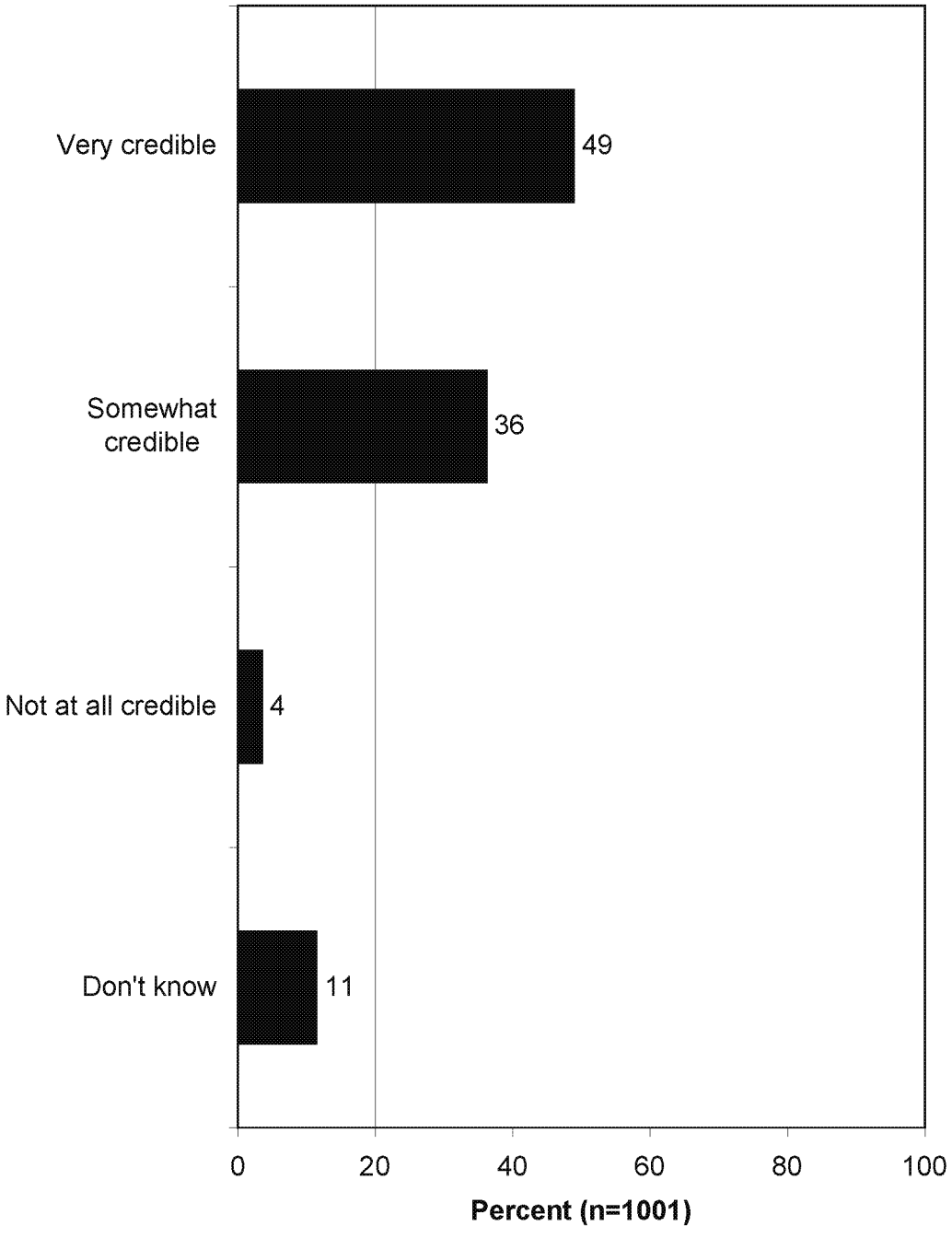
- Respondents rated the efforts of the DEP at protecting and restoring the environment in West Virginia. The ratings were generally positive, with a majority in the top half of the scale: 19% rated the efforts as excellent, and 51% rated the efforts as good (a sum of 70%). Meanwhile, 17% gave a rating of fair, and 4% rated them as poor.
  - The crosstabulation by self-professed knowledge level found that those with higher self-professed knowledge of the agency were more likely than those at lower knowledge levels to rate the effort as excellent, but also more likely to rate it poor. Again, the lower "don't know" percentage among those with higher knowledge levels allows both the excellent and poor percentages to increase.

- The majority of respondents want the DEP to expend more effort protecting and restoring the environment (58% want *much* or *slightly* more effort expended), and about a third are satisfied with the current amount (32% said the *same*). Only 3% indicated wanting *less* effort.
  - Those who profess higher knowledge levels, compared to those at lower self-professed knowledge levels, have a greater tendency to want *much* more effort expended by the DEP at protecting and restoring the environment (44% to 32%). Overall, the two groups are the same regarding wanting *much* or *slightly* more effort: 57% to 58%. However, those at higher self-professed knowledge levels also have a greater tendency to say that they want *less* effort.

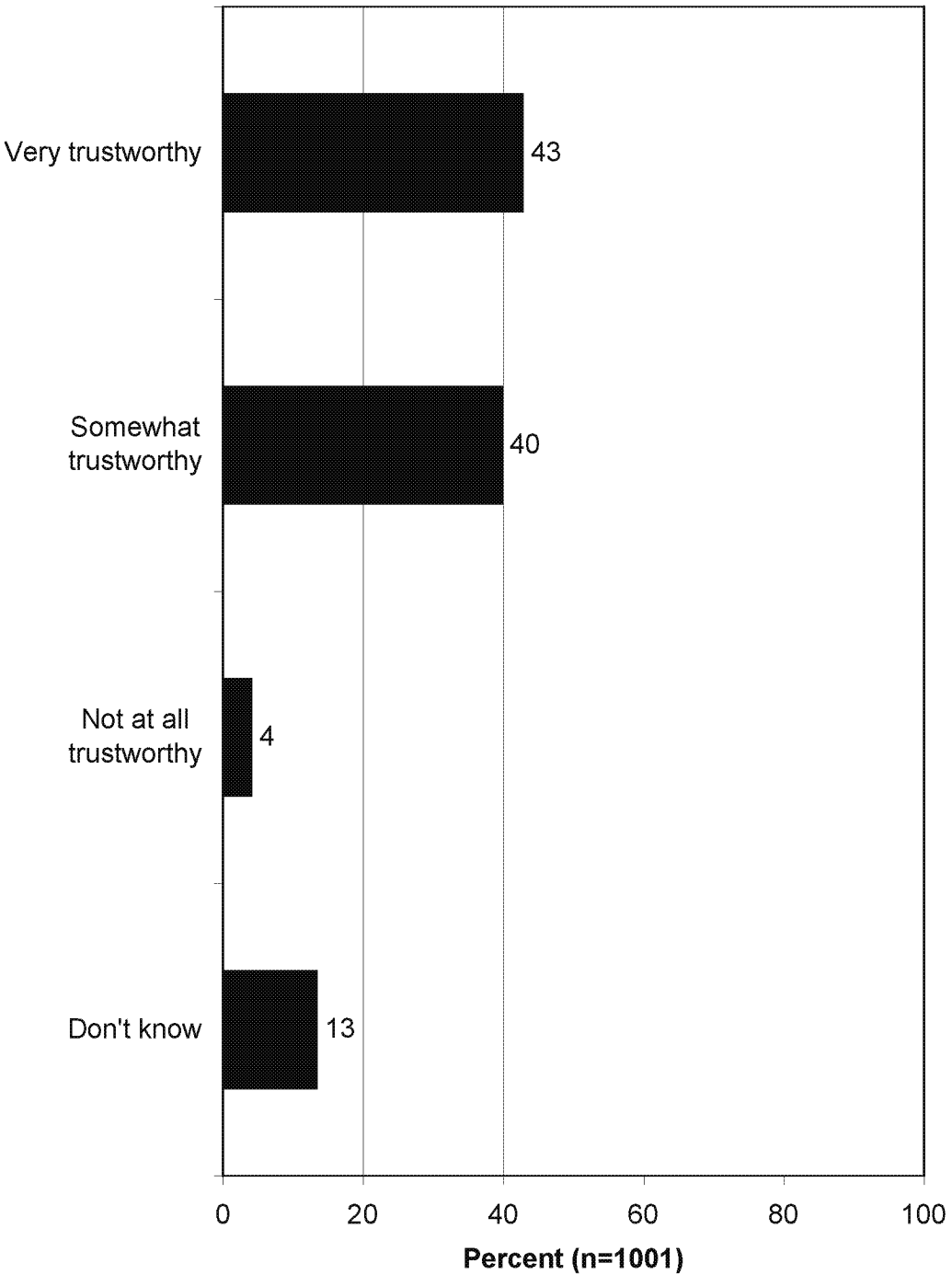
Q43. Would you say you know a great deal, a moderate amount, a little, or nothing about the West Virginia Department of Environmental Protection, also called the DEP?



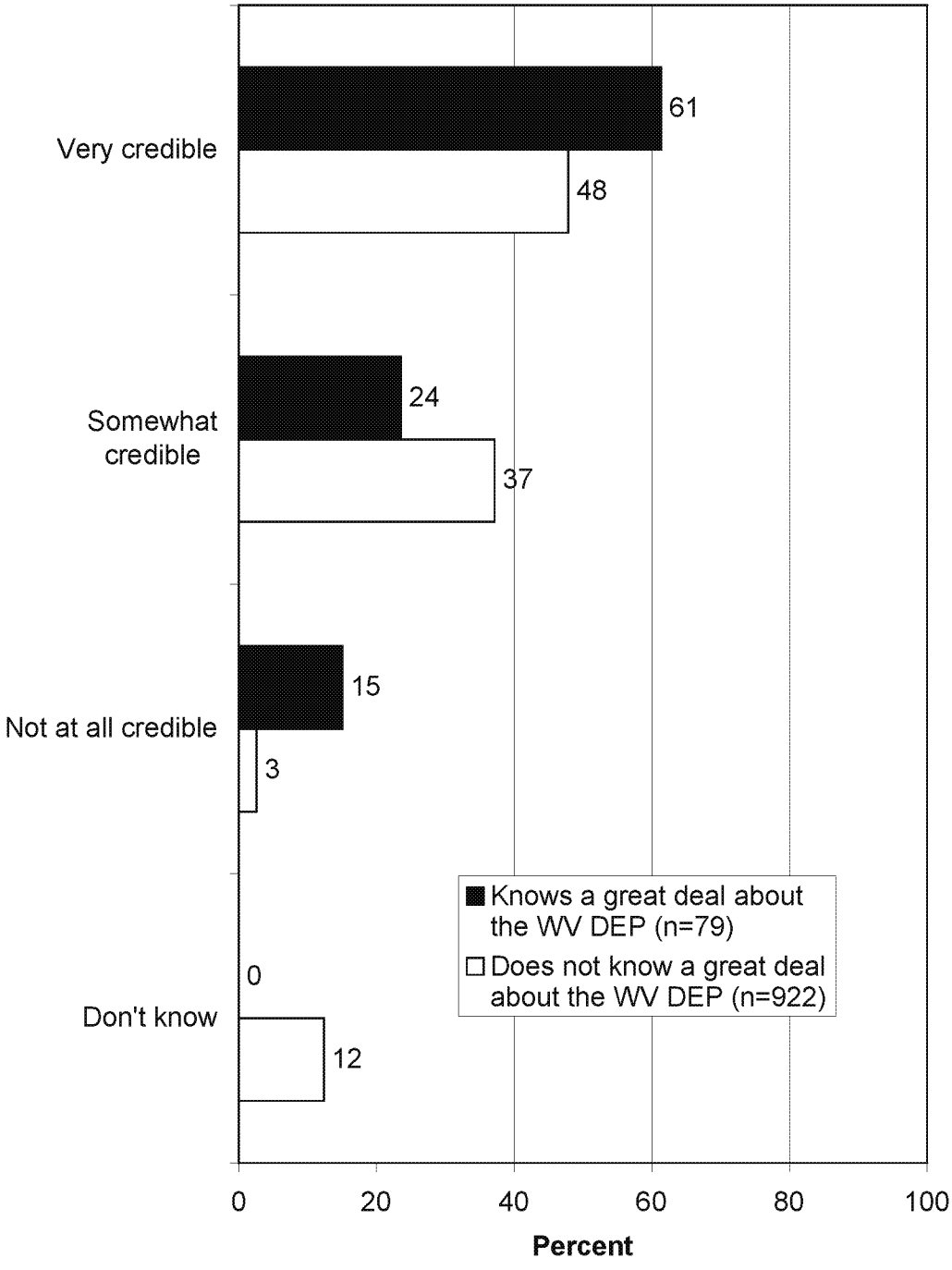
Q46. Do you think the DEP is very credible, somewhat credible, or not at all credible as a source of information on the environment?



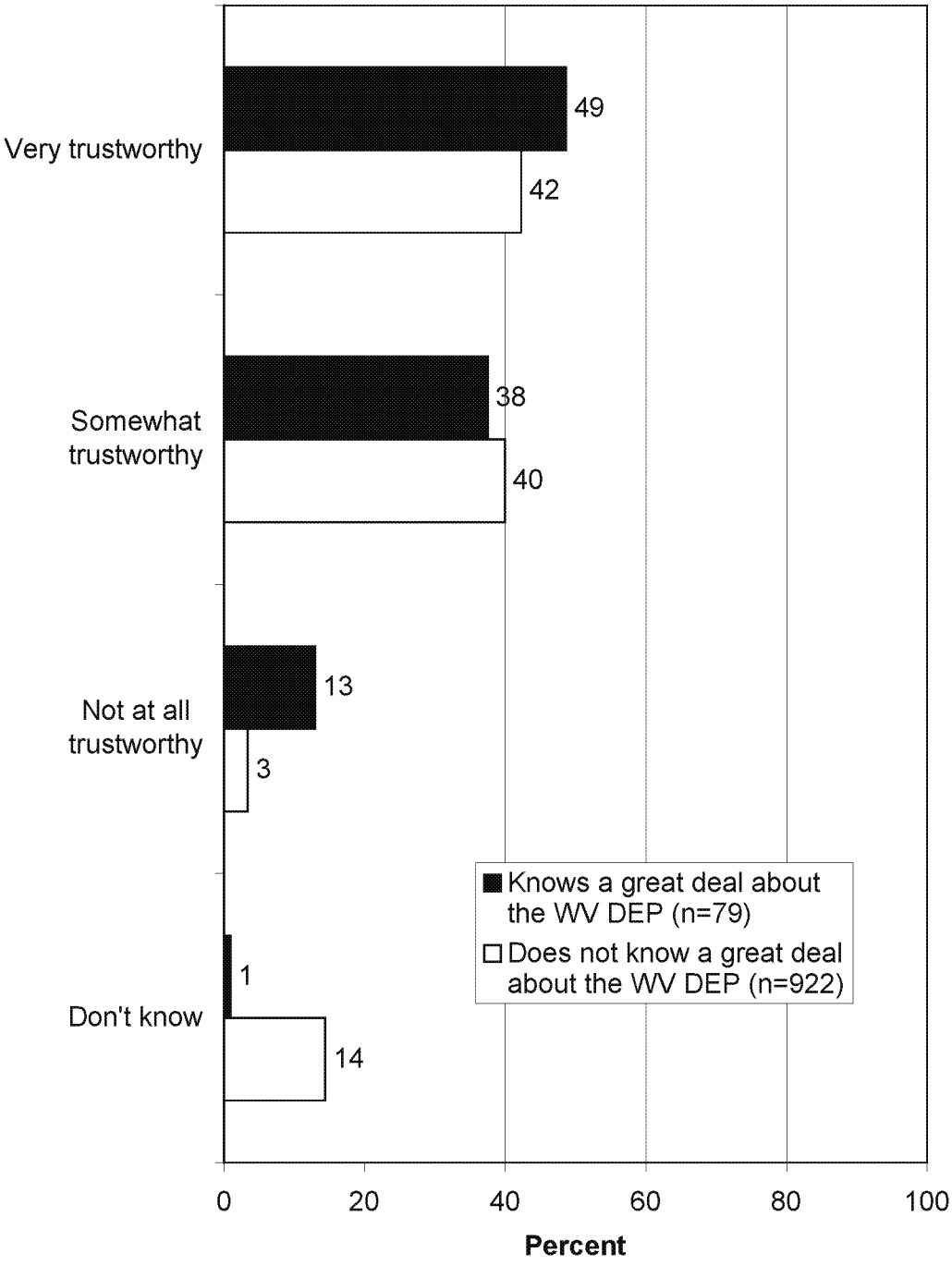
Q47. In your opinion, is the DEP very trustworthy, somewhat trustworthy, or not at all trustworthy?



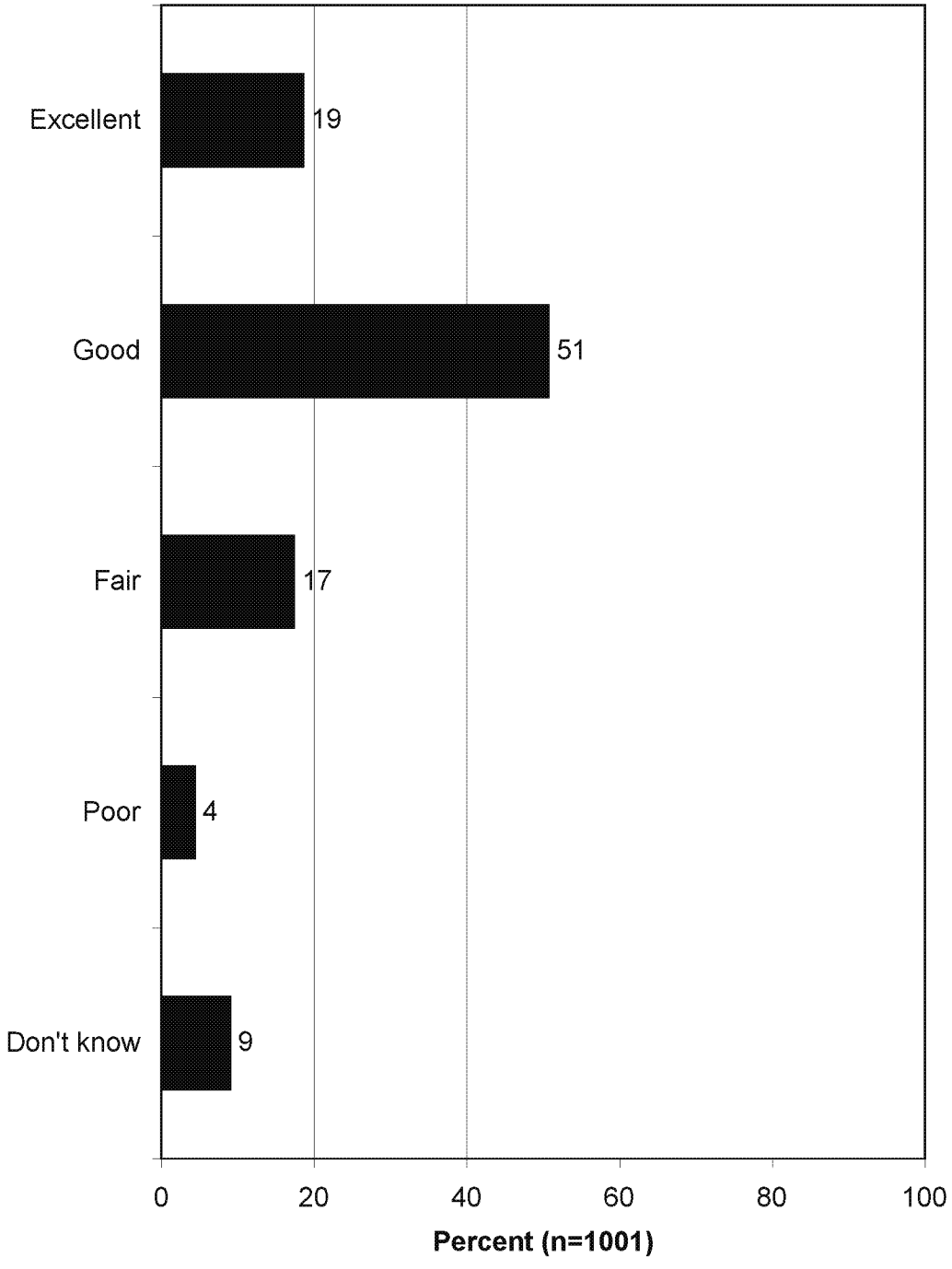
Q46. Do you think the DEP is very credible, somewhat credible, or not at all credible as a source of information on the environment?



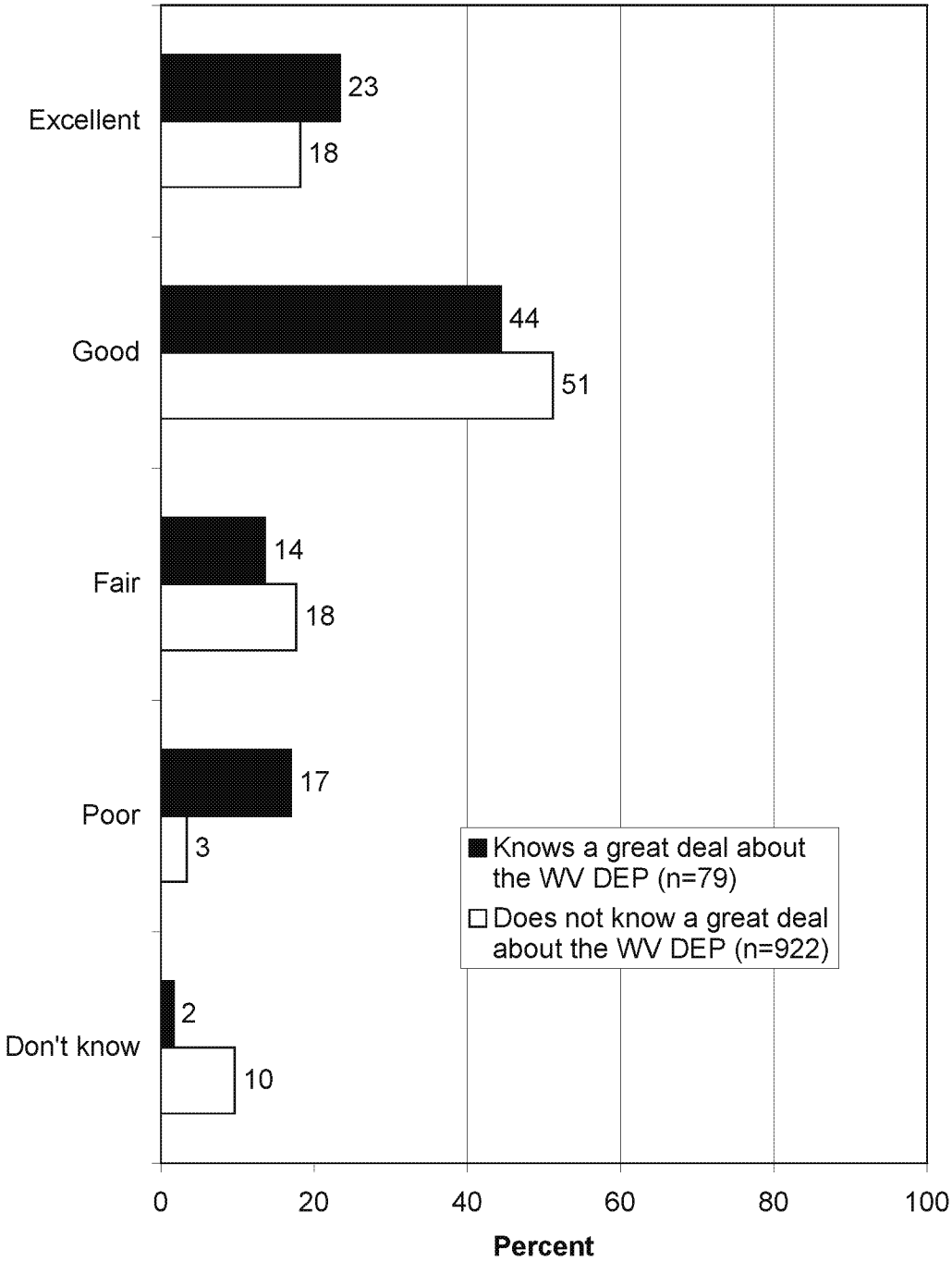
Q47. In your opinion, is the DEP very trustworthy, somewhat trustworthy, or not at all trustworthy?



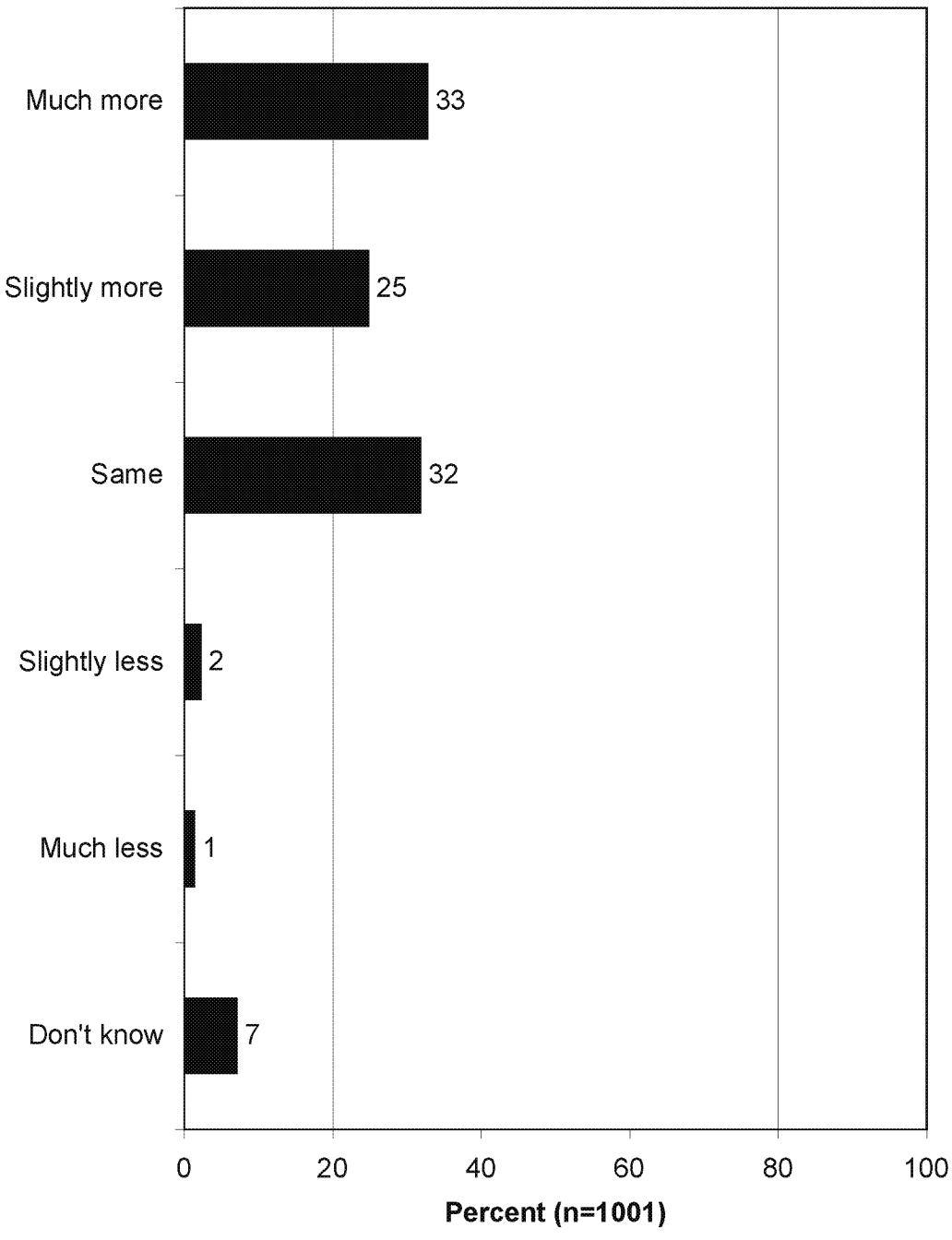
Q48. Overall, how would you rate the DEP's efforts to protect and restore the environment in West Virginia?



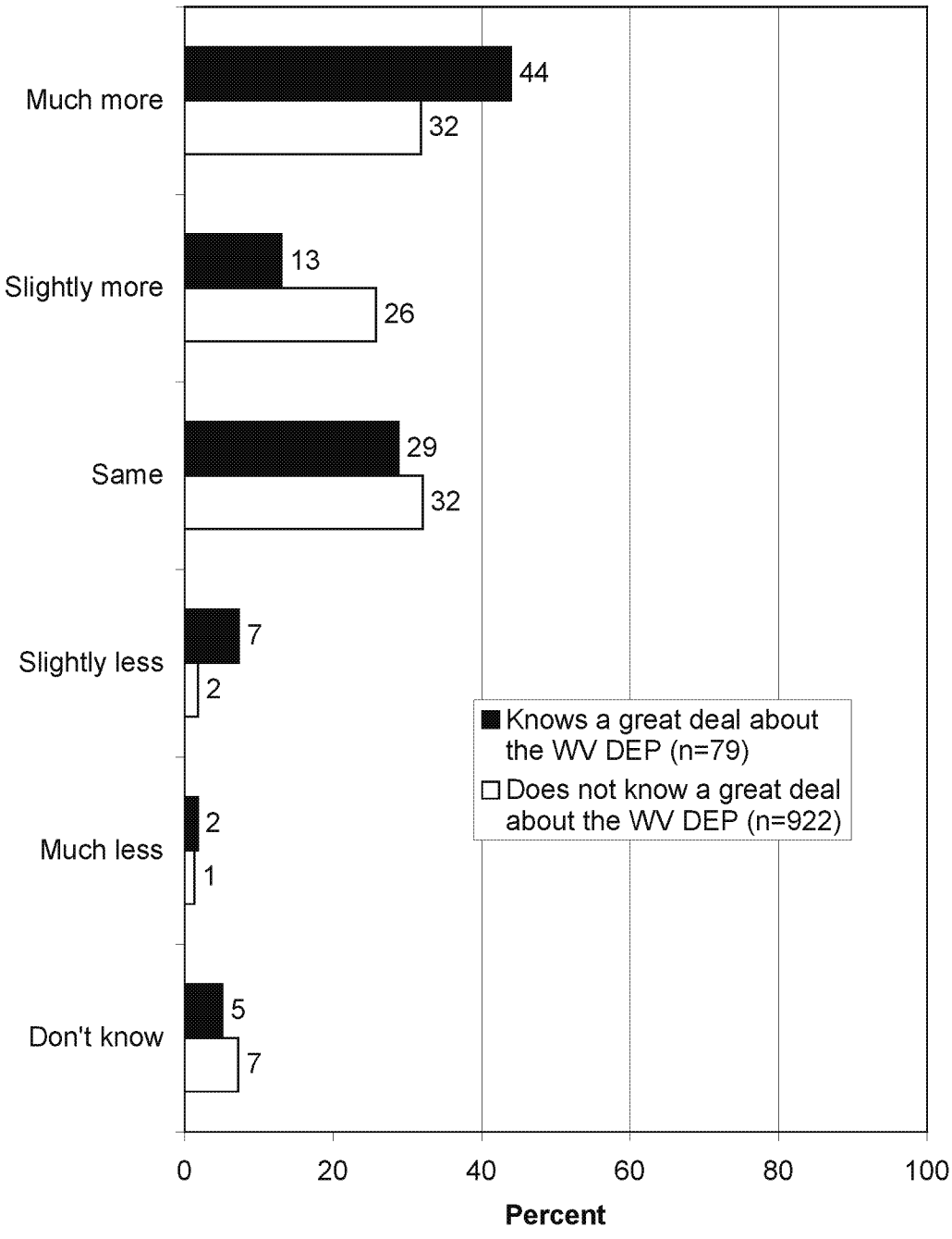
Q48. Overall, how would you rate the DEP's efforts to protect and restore the environment in West Virginia?



Q49. Do you think the DEP should spend more, the same, or less effort to protect and restore the environment?



Q49. Do you think the DEP should spend more, the same, or less effort to protect and restore the environment?



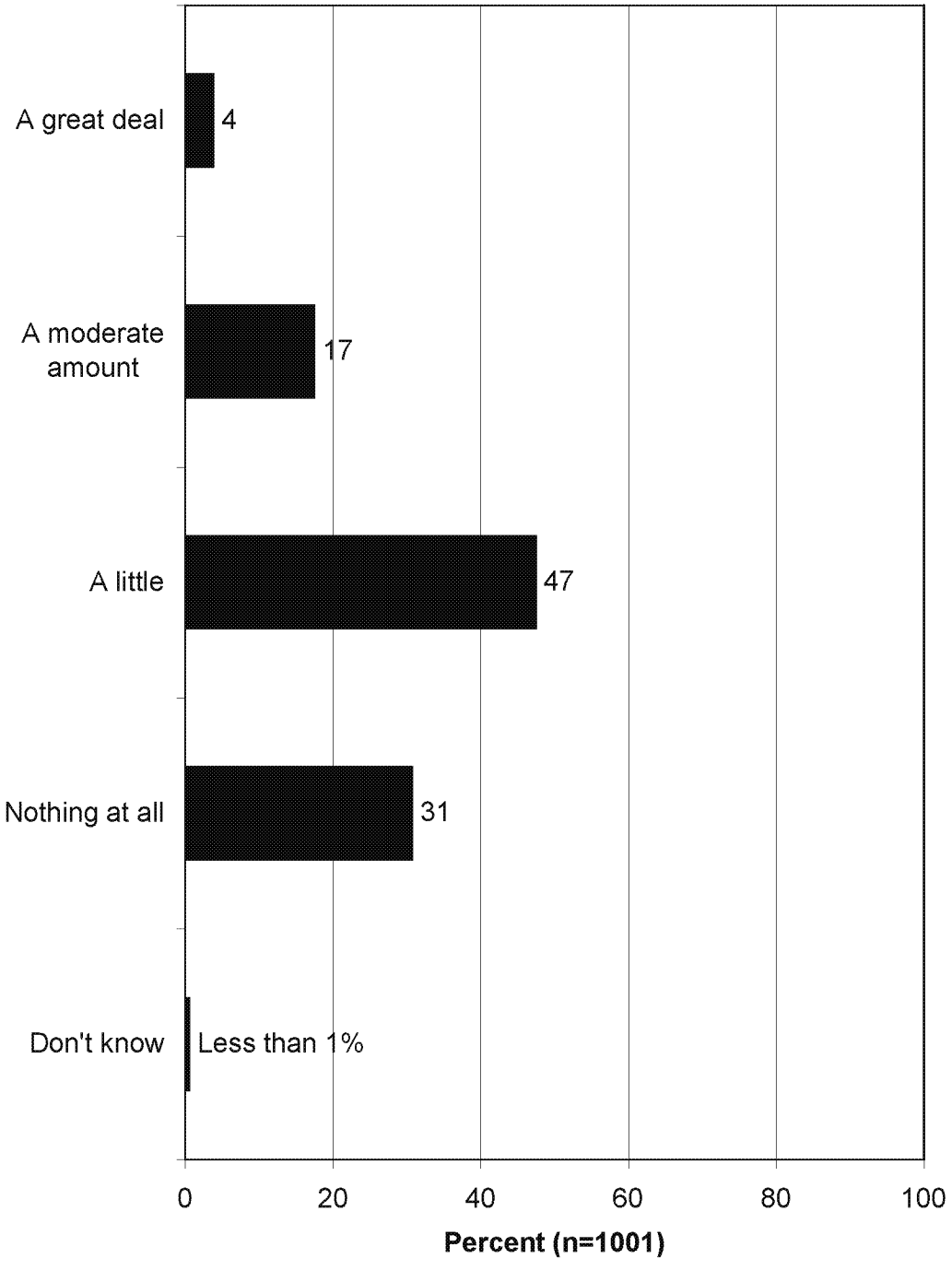
OPINIONS ON ALGAE IN WEST VIRGINIA WATERS

KNOWLEDGE AND AWARENESS OF ALGAE

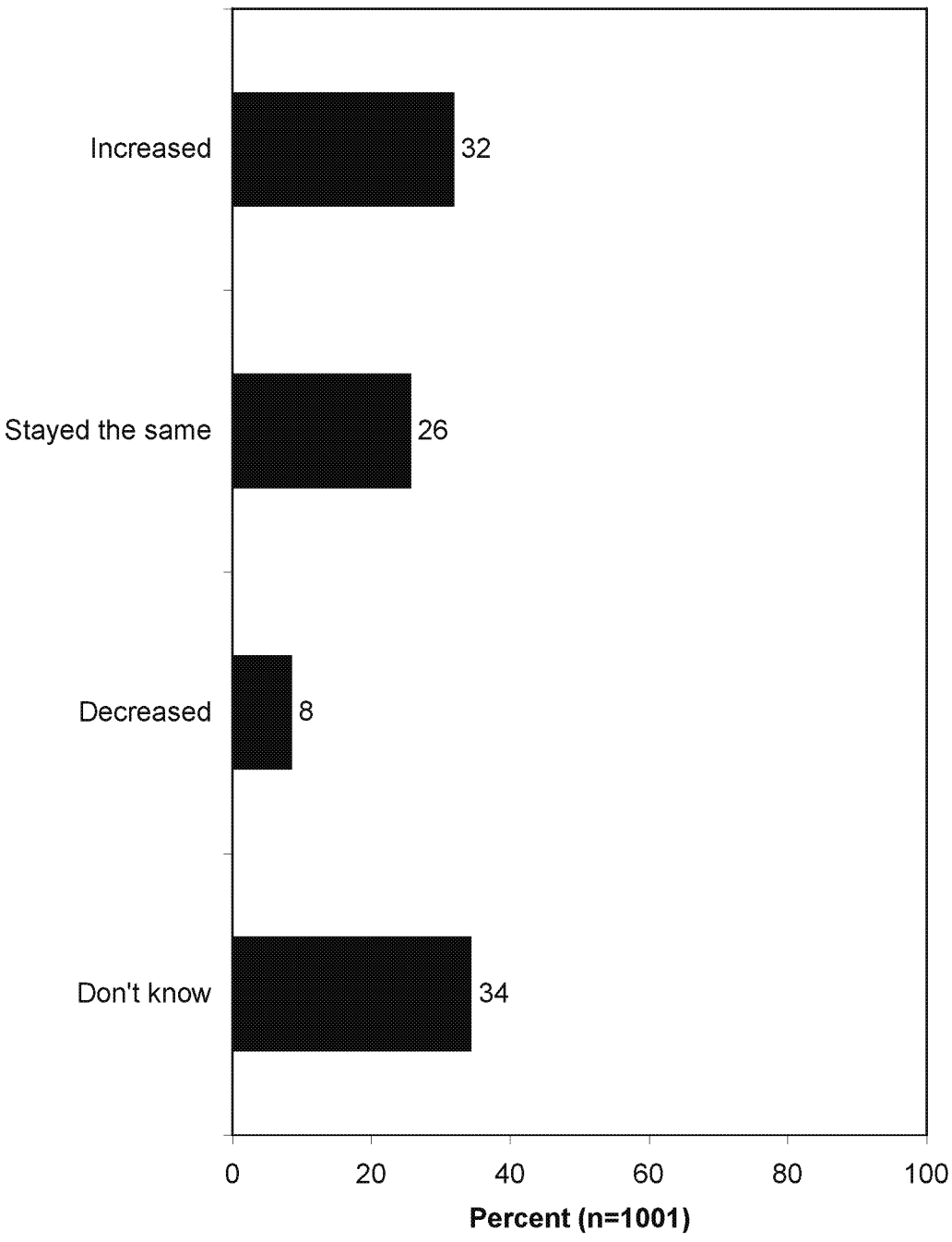
- Self-professed knowledge levels of algae in West Virginia waters is relatively low: 78% indicate knowing *a little* or *nothing at all* about it. At the other end, 21% say that they know *a great deal* or *moderate amount* (with only 4% at the highest level of *a great deal*).

- Respondents were asked if algae in West Virginia waters over the past 2 years has increased, stayed the same, or decreased. Most commonly, respondents with an opinion (i.e., those who did not say "don't know") say the levels have increased (32%), closely followed by the percentage saying that the levels have stayed the same (26%). Only 8% think levels have decreased. More than a third (34%) answered that they do not know.
  - This question was crosstabulated by participation in water-based activities on one of the three rivers of interest in this study (the three rivers of interest, chosen because of past algae issues on them, are the Greenbrier River, the South Branch of the Potomac, and the Cacapon River). This crosstabulation found that those who recreated on one of those rivers are more likely to think that algae has increased, compared to those who participated in water-based recreation but not on one of those three rivers.

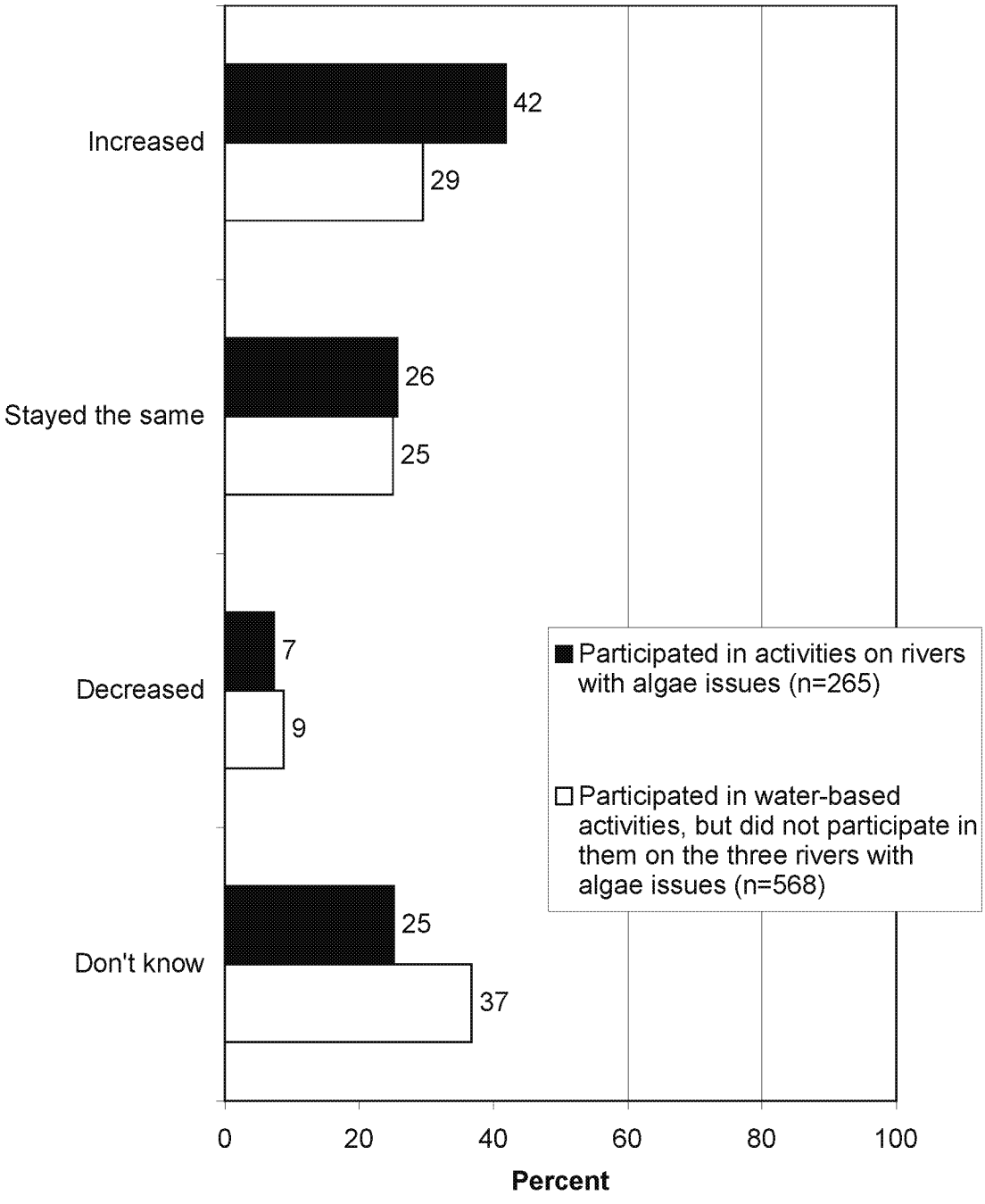
Q53. How much would you say you know about algae in West Virginia waters?



Q54. Would you say algae in West Virginia waters has increased, stayed about the same, or decreased in the past 2 years?



Q54. Would you say algae in West Virginia waters has increased, stayed about the same, or decreased in the past 2 years?



OPINIONS ON ALGAE IN GENERAL

- The survey presented respondents with a scale regarding whether algae bothers them or not, and they are more bothered than not. The scale ran from "algae doesn't bother me at all" through "algae doesn't bother me, but I worry about problems it may cause" to "I generally regard algae as a nuisance." (To allow all answers, there is a neutral answer of "I have no particular feelings about algae.") Respondents are predominantly in the middle to the least tolerant of algae on the scale: 32% are in the middle ("algae doesn't bother me, but I worry about problems it may cause") and 26% are at the least tolerant ("I generally regard algae as a nuisance"); meanwhile, only 10% are not bothered at all about algae.
  - This question was crosstabulated by participation in water-based activities on one of the three rivers of interest (the Greenbrier River, the South Branch of the Potomac, and the Cacapon River). These participants are more likely to express concern about algae and are less likely to have no opinion about it, compared to their counterparts.

- Another line of questioning asked respondents directly if they agreed or disagreed that "algae is a problem in West Virginia." They are split in their opinions. Note that the sample was split in half to eliminate bias, and the question was asked in two ways. Respondents in the first half of the sample were asked if they agreed or disagreed with this statement: "Algae is a problem in West Virginia." Respondents in the second half of the sample were asked if they agreed or disagreed with this statement: "Algae is not a problem in West Virginia."
  - In coding the two questions together (reverse coding the "not" question), the analysis found that from 32% to 44% think that algae is a problem, and from 29% to 34% think that algae is not a problem. A relatively large percentage gave a neutral answer (neither agreed nor disagreed or answered that they did not know) (from 27% to 34%).

- The survey asked respondents whether they had been concerned about algae in West Virginia waters over the past 2 years: a quarter (25%) answered that they had been.

- A series of 10 questions gauged residents' opinions on algae. For each question, a statement about algae (some negative, some positive) was read to respondents, who indicated if they agreed or disagreed with the statement. This allows for a comparison of various themes as they relate to algae. The tabulation below shows the themes, the statements read to respondents, and an indication of whether the statement is negative or positive.
  - Because some statements reflected a positive opinion and others a negative opinion, for comparison, the negative statements were reverse coded. In other words, strong agreement to a negative statement was compared to strong *dis*agreement to a positive statement, and so forth. In this way, the themes could be compared.

Theme	**Statement Read to Respondents**	**Agreeing Is a Negative or Positive Opinion About Algae**
Aesthetics	Algae is generally unattractive and unappealing.	Negative
Ecological	Algae is beneficial for the ecosystem in some situations.	Positive
	Algae makes natural public waters unhealthy for fish and plant life.	Negative
Recreational	The current algae levels in West Virginia waters do not bother me when participating in water activities.	Positive
	Algae causes safety hazards for people participating in activities on or in West Virginia waters.	Negative
Health	Algae in natural public waters is not a health hazard for people.	Positive
Overall (in General)	Algae is a problem in West Virginia.	Negative
	Algae is not a problem in West Virginia.	Positive

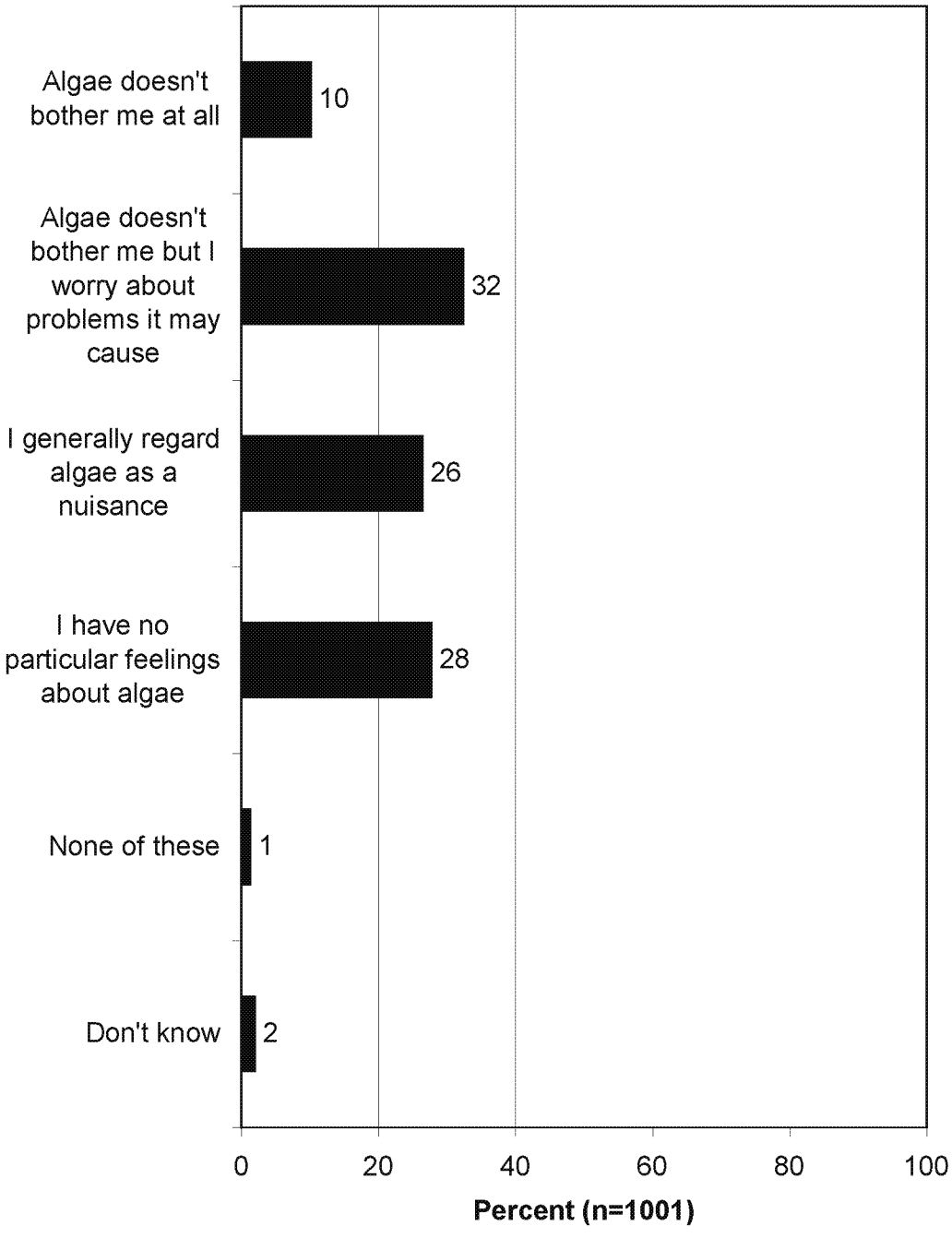
- In looking at holding a strong negative opinion, the aesthetic theme resonated with respondents: the top statement by far is "Algae is generally unattractive and unappealing" (45% strongly agree).
- In examining a strong or moderate negative opinion, the aforementioned aesthetic theme was the top ranked item by far (79% agreed), followed by the recreational theme: "Algae causes safety hazards for people participating in activities on or in West Virginia waters" (57% agreed).
- In looking at any positive opinions about algae, it appears that West Virginia residents understand that some amount of algae is part of a natural ecosystem: the top positive

opinion about algae is that "Algae is beneficial for the ecosystem in some situations" (79% of residents agree with this statement, including 36% who strongly agree). The second spot in the positive realm is recreational: "The current algae levels in West Virginia waters do not bother me when participating in water activities" (55% agree, with 29% strongly agreeing).

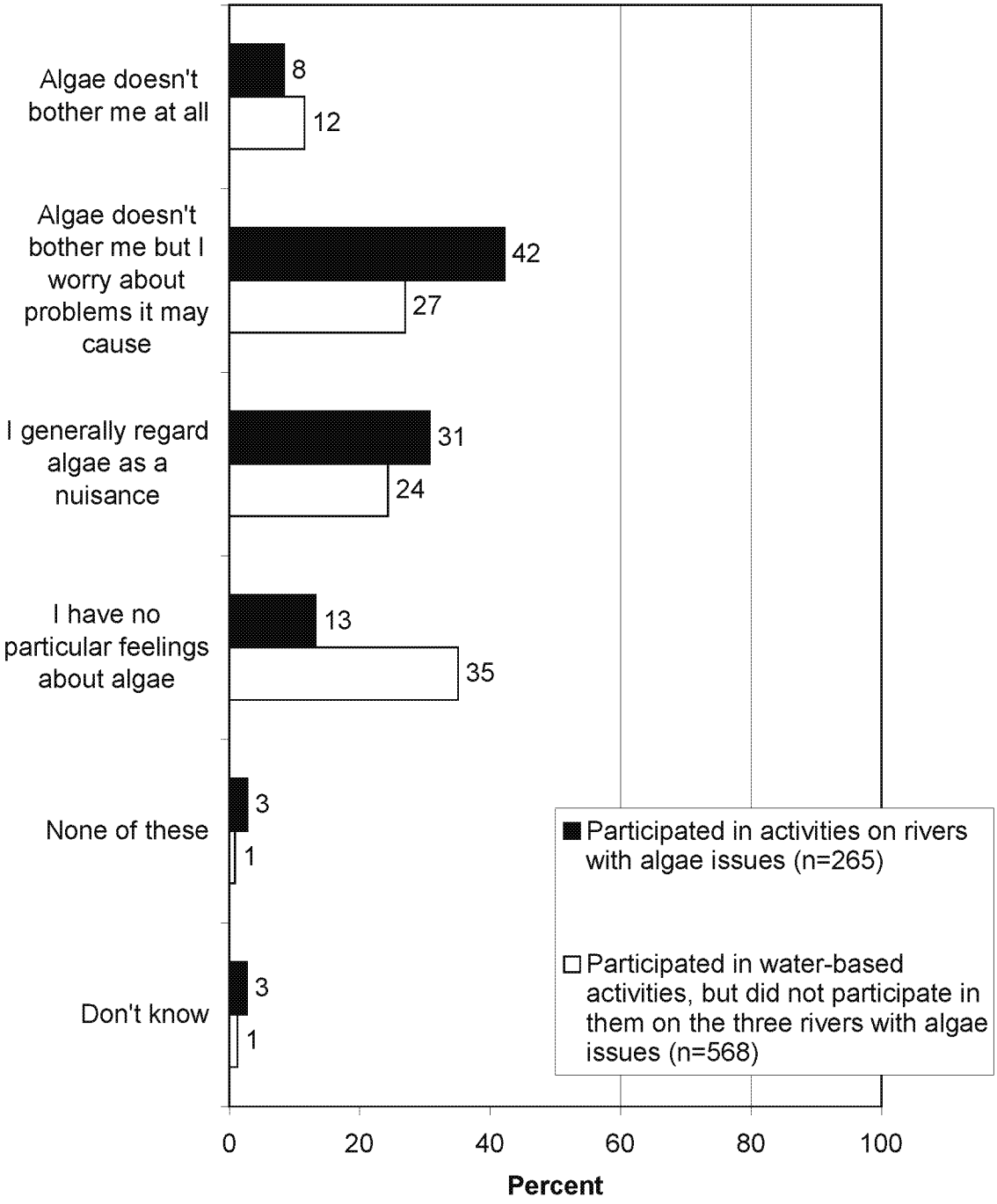
- The fact that a recreational theme resonates both negatively and positively suggest a dichotomy among recreationists: some recreationists are not bothered by algae when they participate in water-based recreational activities, while other recreationists consider algae a safety hazard, but there is no consensus among recreationists.
- Crosstabulations were run of two of the statements to further explore this dichotomy: "The current algae levels in West Virginia waters do not bother me when participating in water activities" and "Algae causes safety hazards for people participating in activities on or in West Virginia waters." The crosstabulations found that boaters using human power only were more likely than power boaters to disagree that "current algae levels in West Virginia waters do not bother me when participating in water activities" (in other words, more likely to be bothered by algae). Also, human powered boaters were more likely to agree that "algae causes safety hazards for people participating in activities on or in West Virginia waters." In short, boaters using human power show a more negative opinion of algae, compared to power boaters.

- Crosstabulations of this series of questions found that those who participated in activities on or in West Virginia waters of the three rivers of interest (the Greenbrier, the South Branch of the Potomac, or the Cacapon) have more negative opinions of algae, compared to those who participated in water-based activities but not on any of the three rivers of interest.

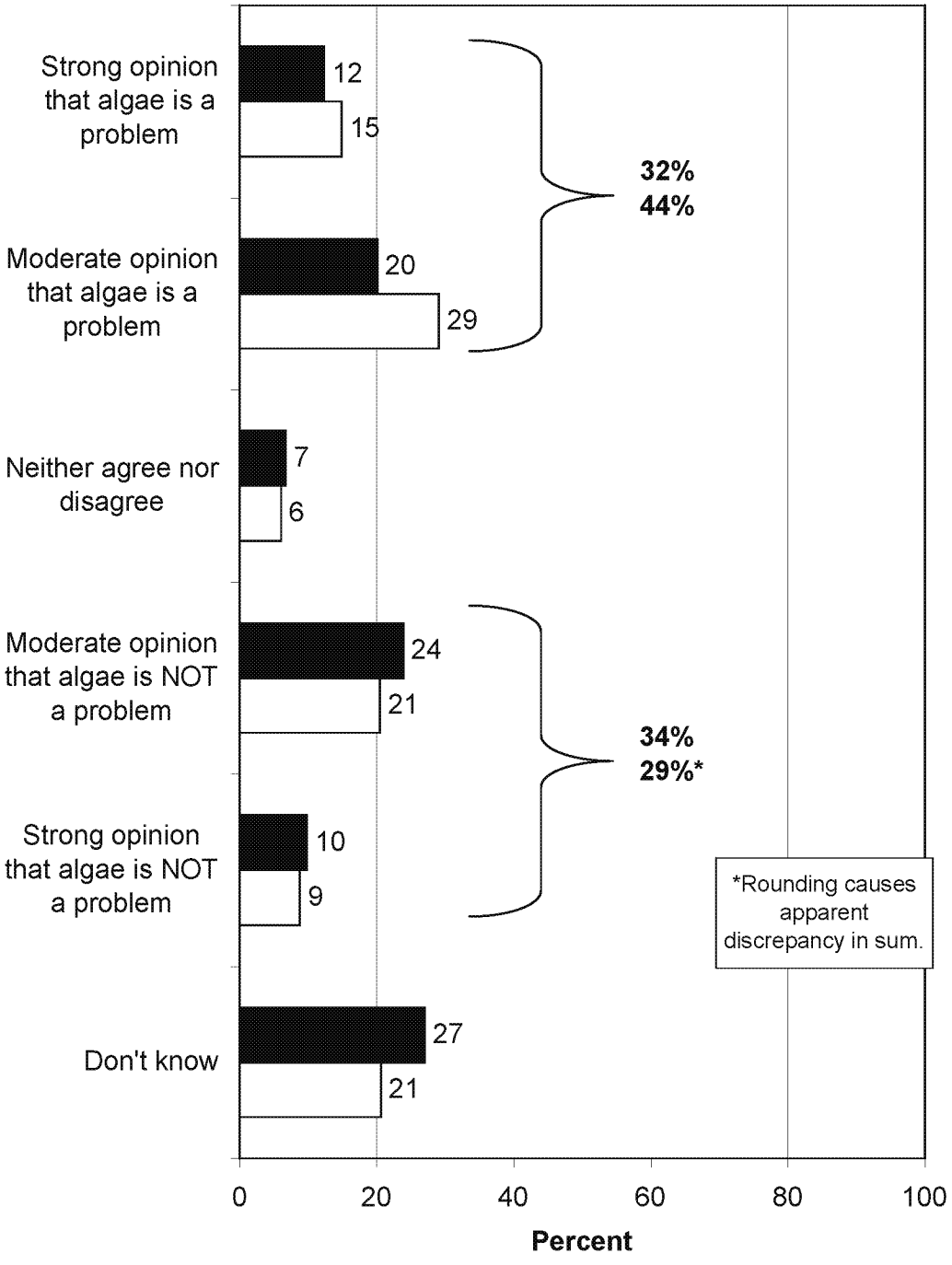
Q55. Generally, which of the following best describes your feelings about algae in West Virginia waters in the past 2 years?



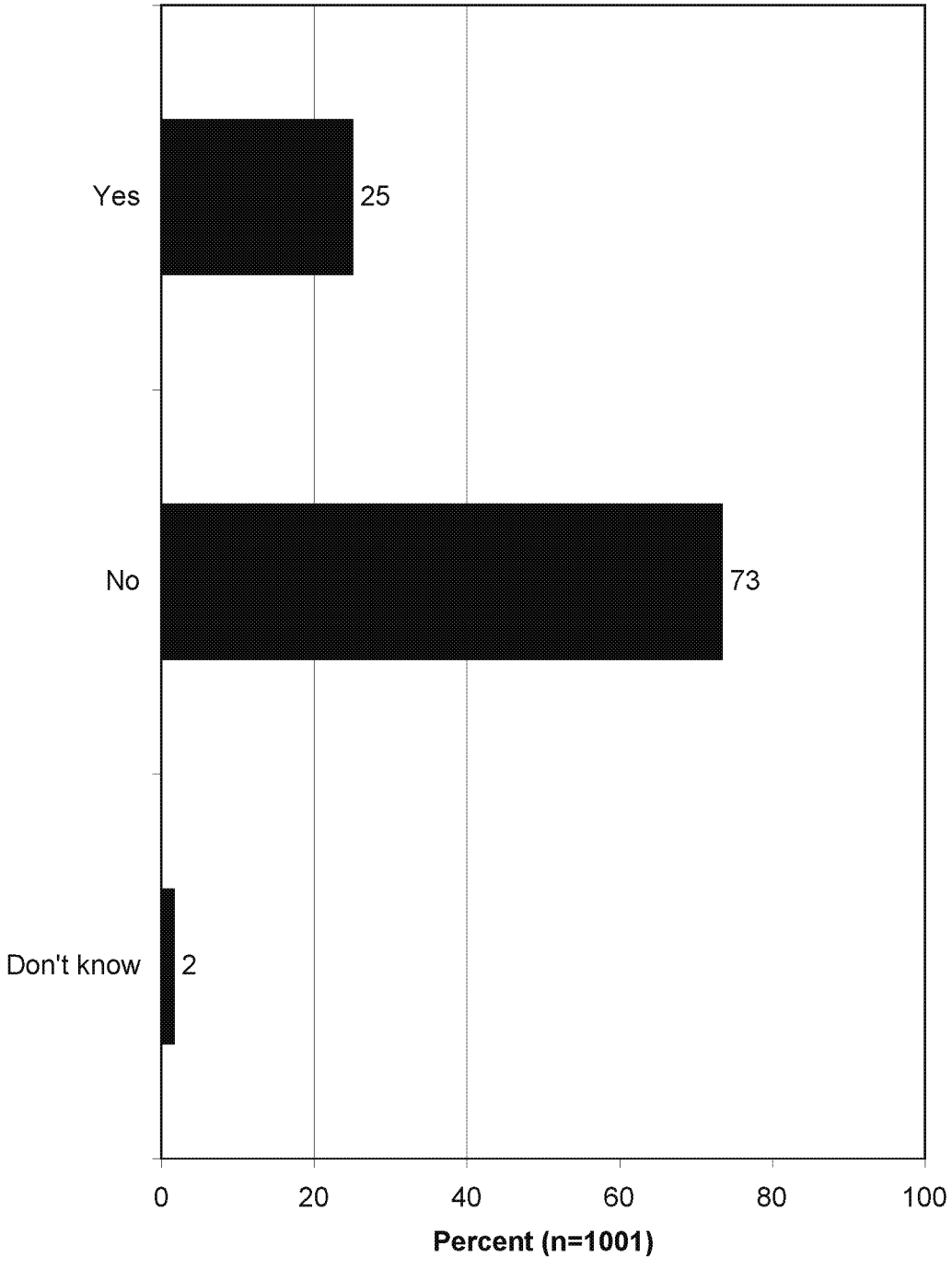
Q55. Generally, which of the following best describes your feelings about algae in West Virginia waters in the past 2 years?



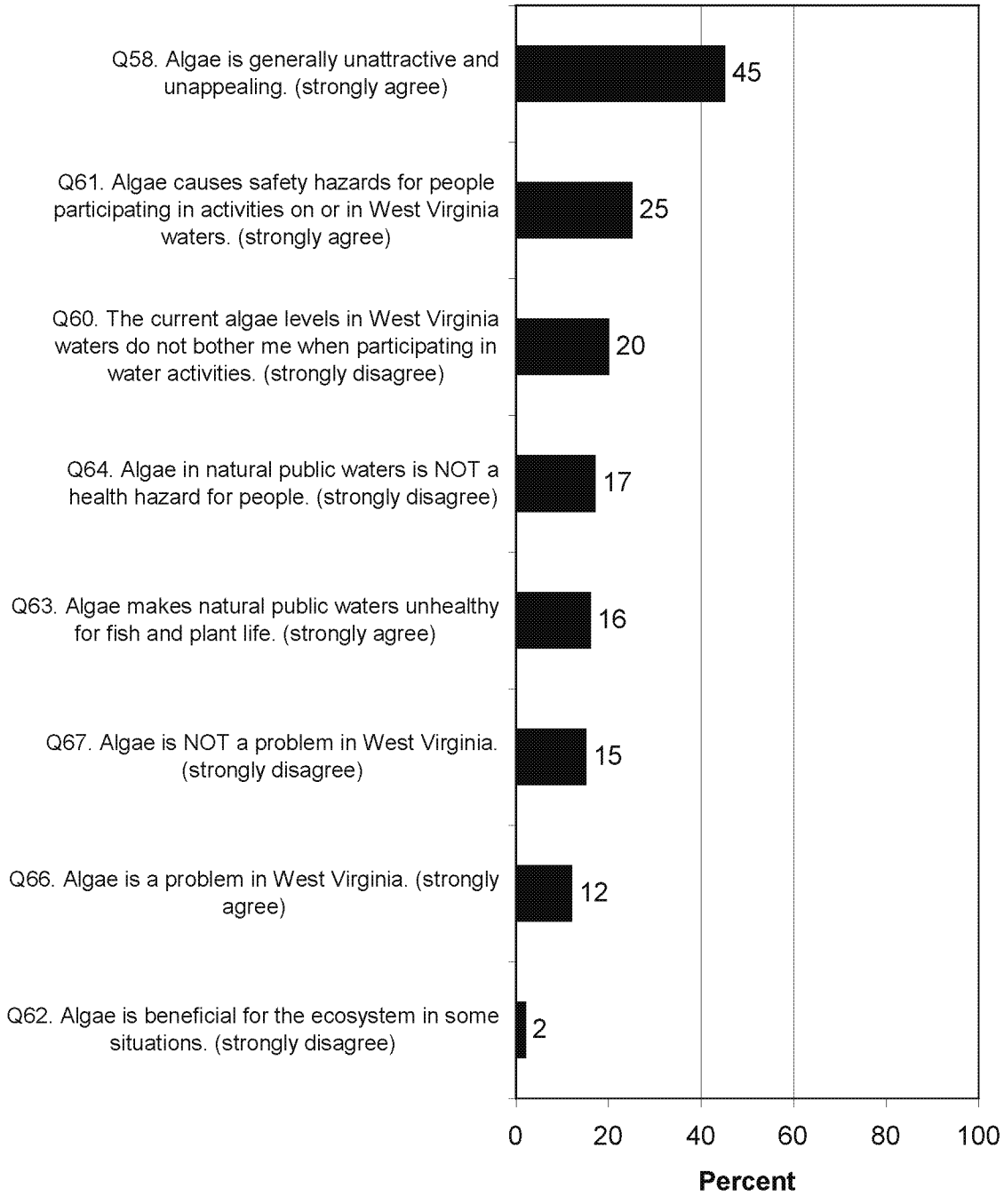
Q66. Algae is a problem in West Virginia.
Q67. Algae is NOT a problem in West Virginia.
(Q67 has been reverse coded for comparison.)



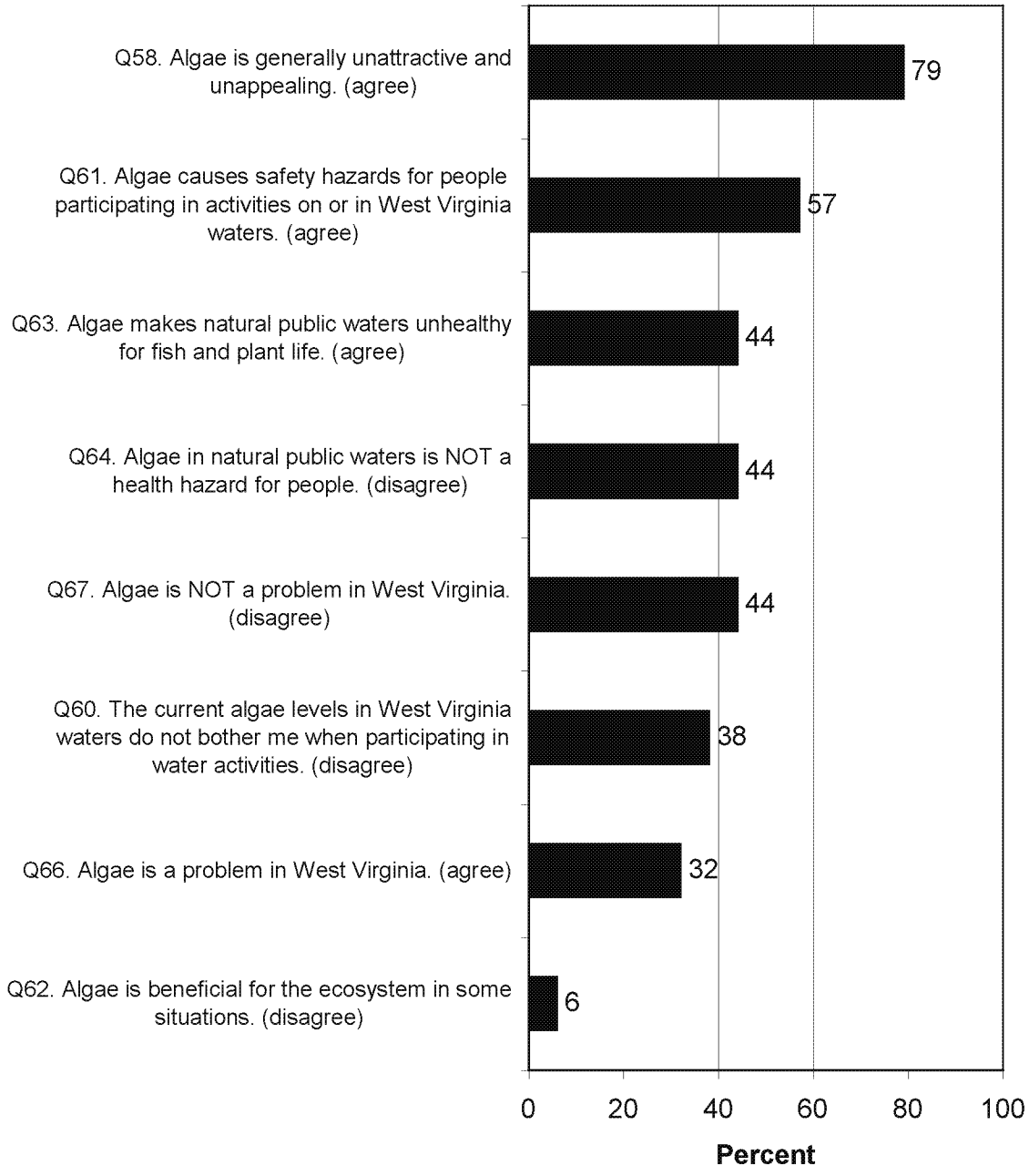
Q86. Over the past 2 years, have you been concerned at all about algae in West Virginia waters?



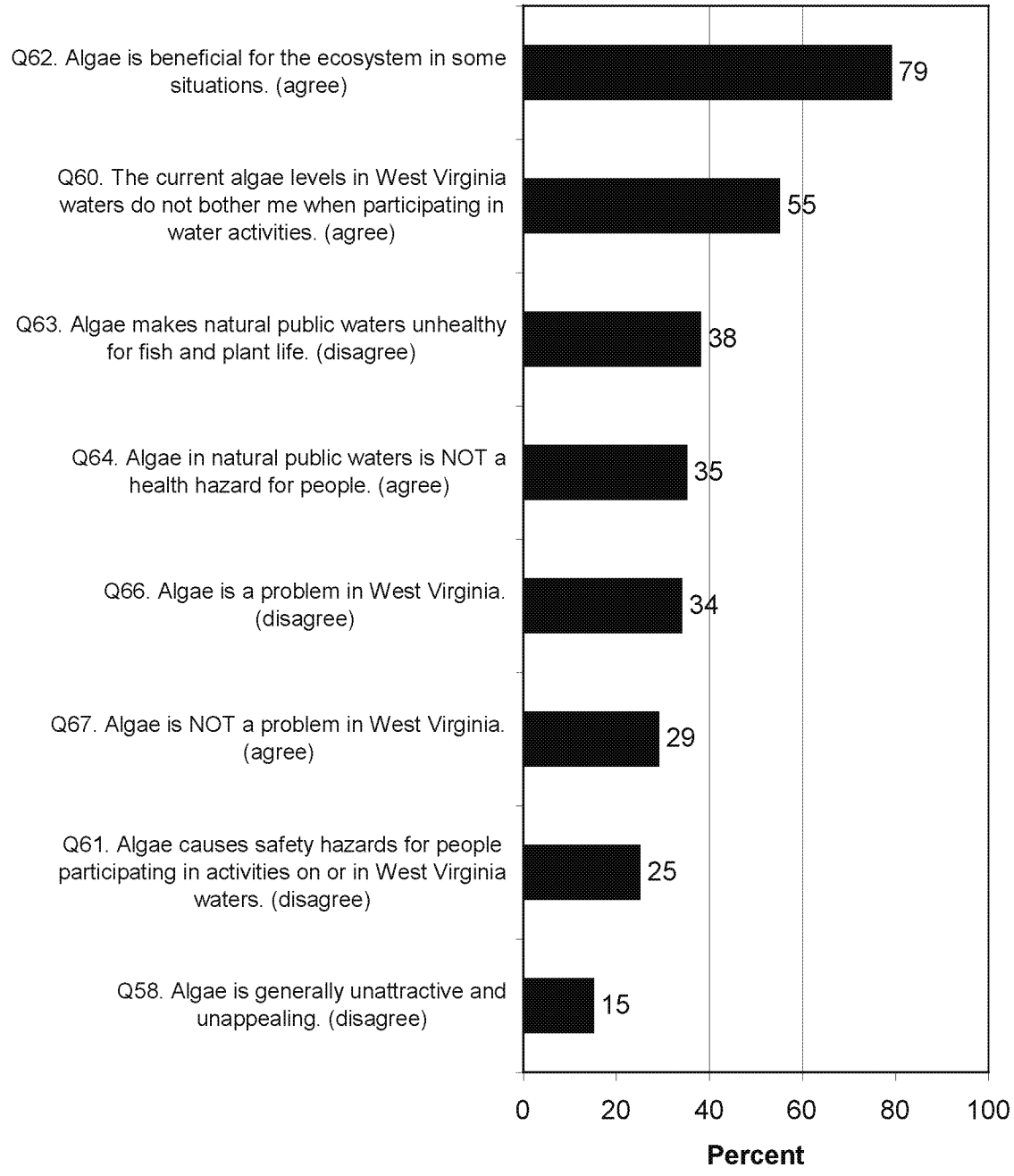
Q58-67. Percent of respondents who have a strong negative opinion about algae:



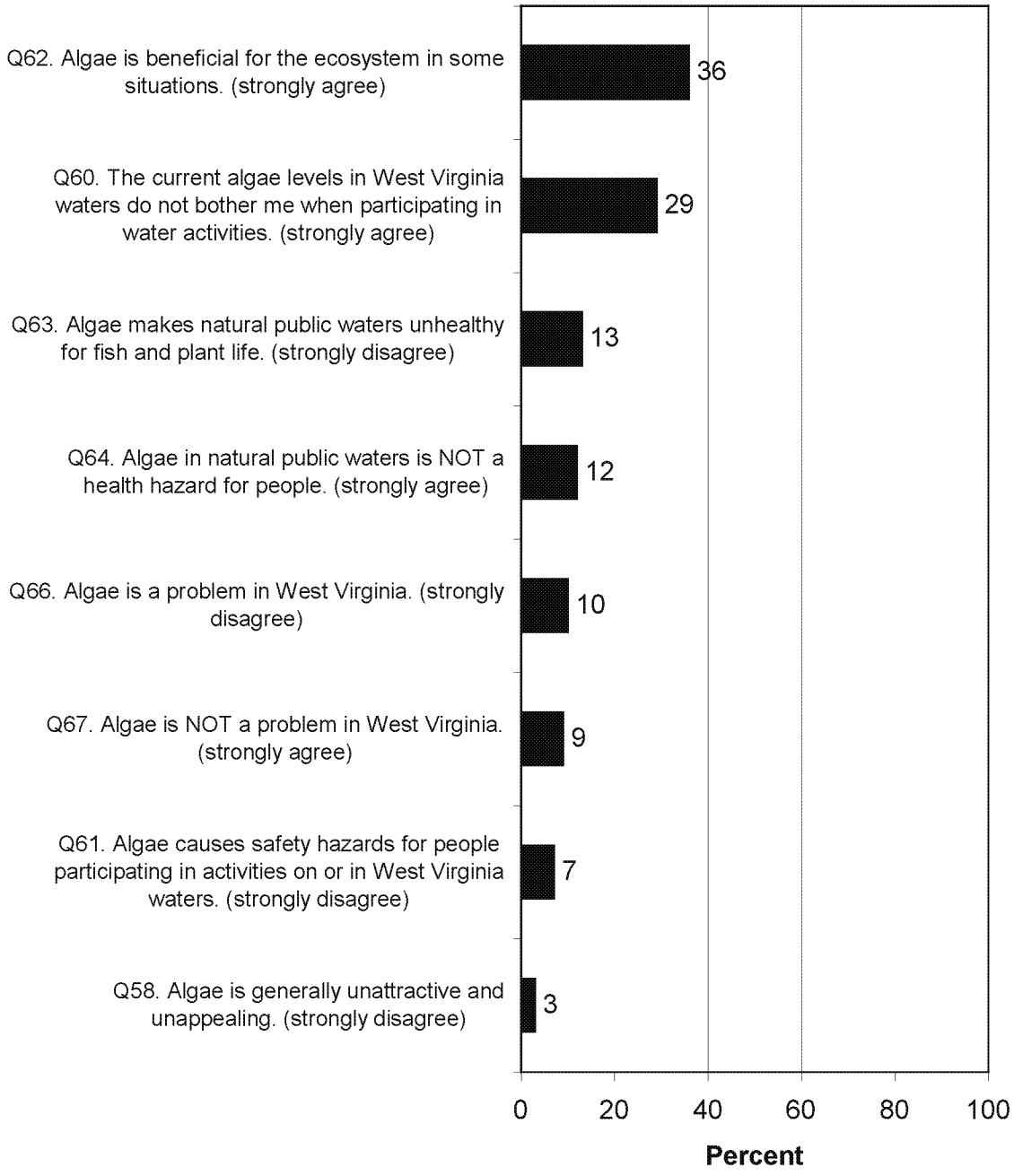
Q58-67. Percent of respondents who have a strong or moderate negative opinion about algae:



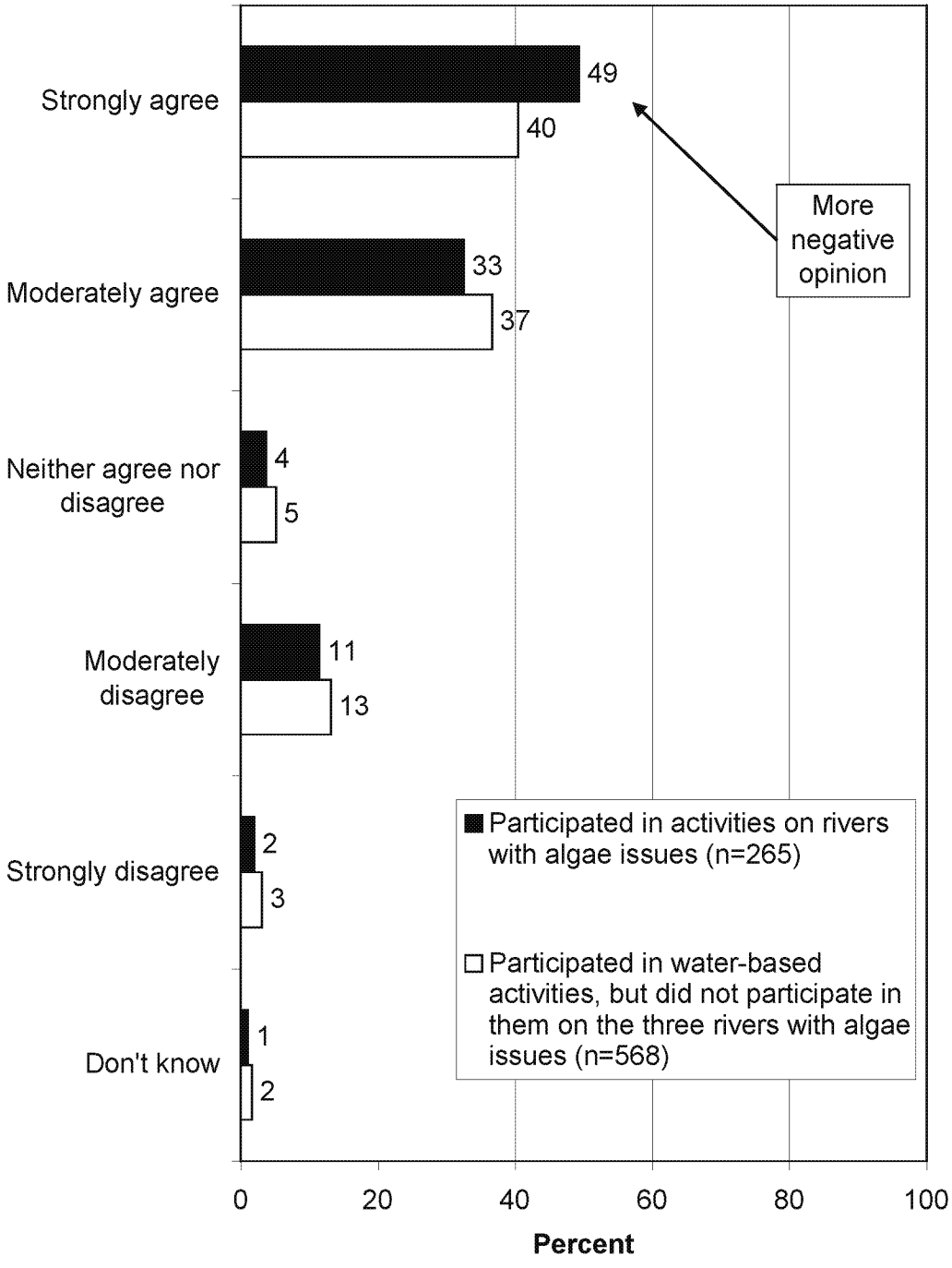
Q58-67. Percent of respondents who have a strong or moderate positive opinion about algae:



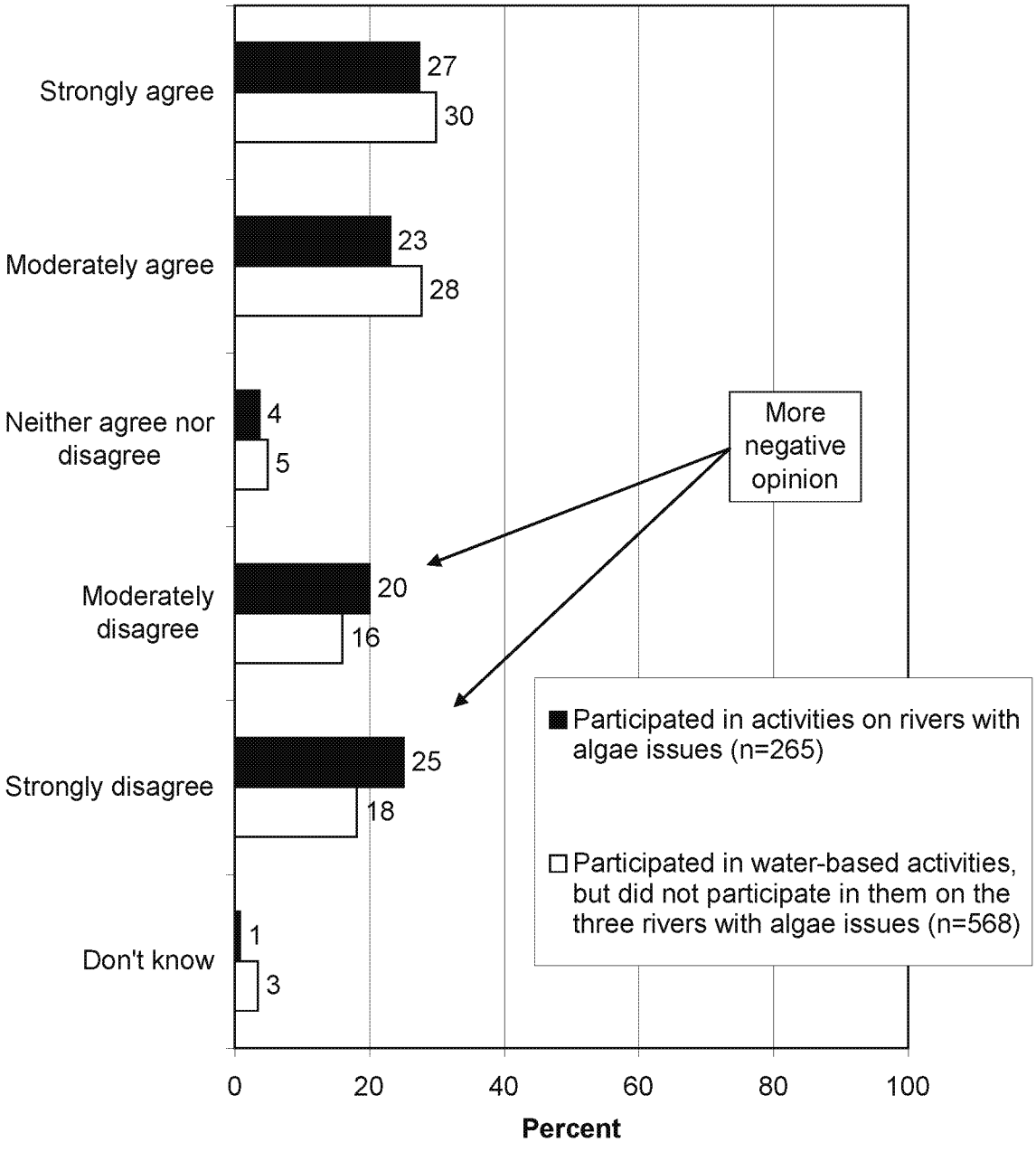
Q58-67. Percent of respondents who have a strong positive opinion about algae:



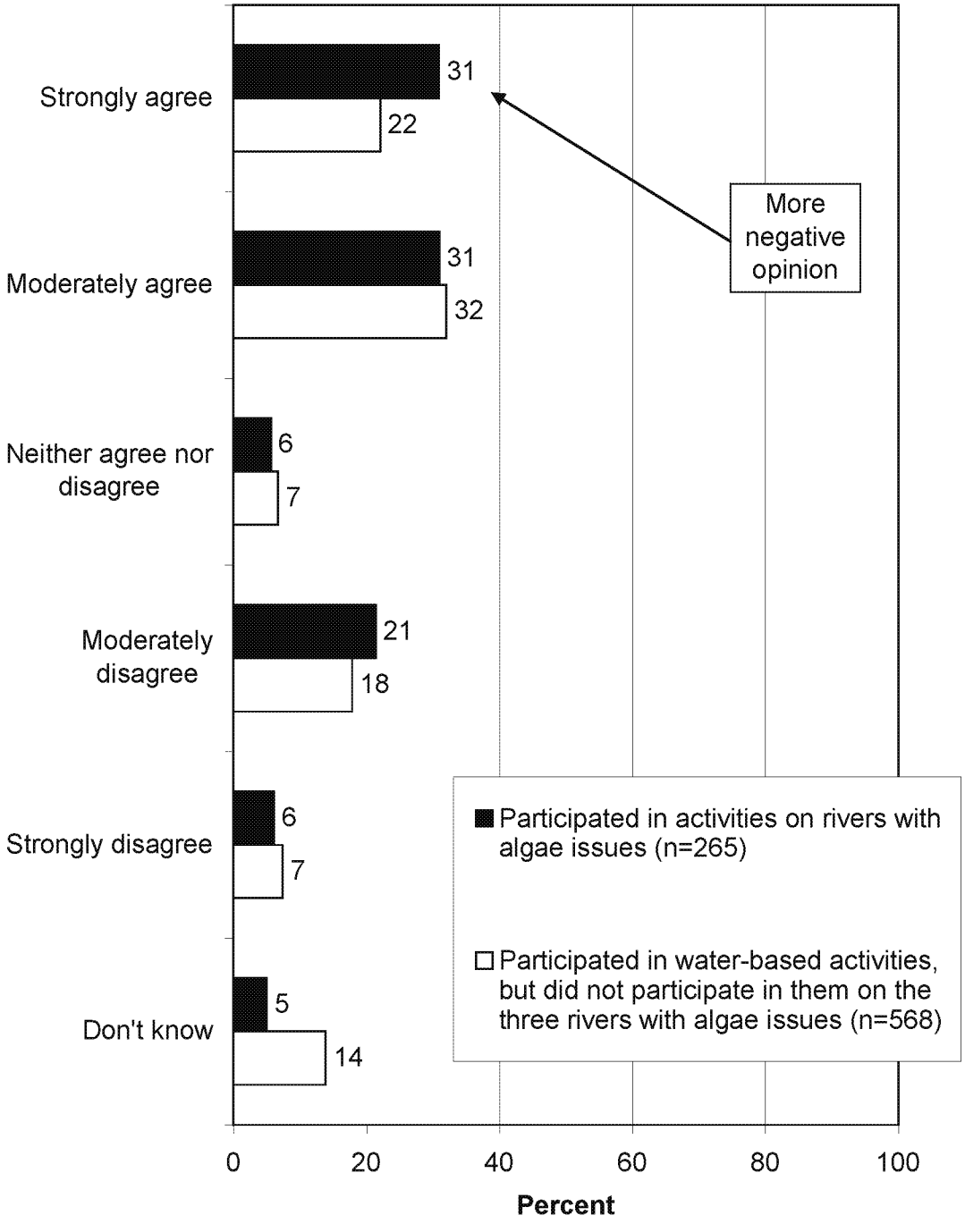
Q58. Algae is generally unattractive and unappealing.



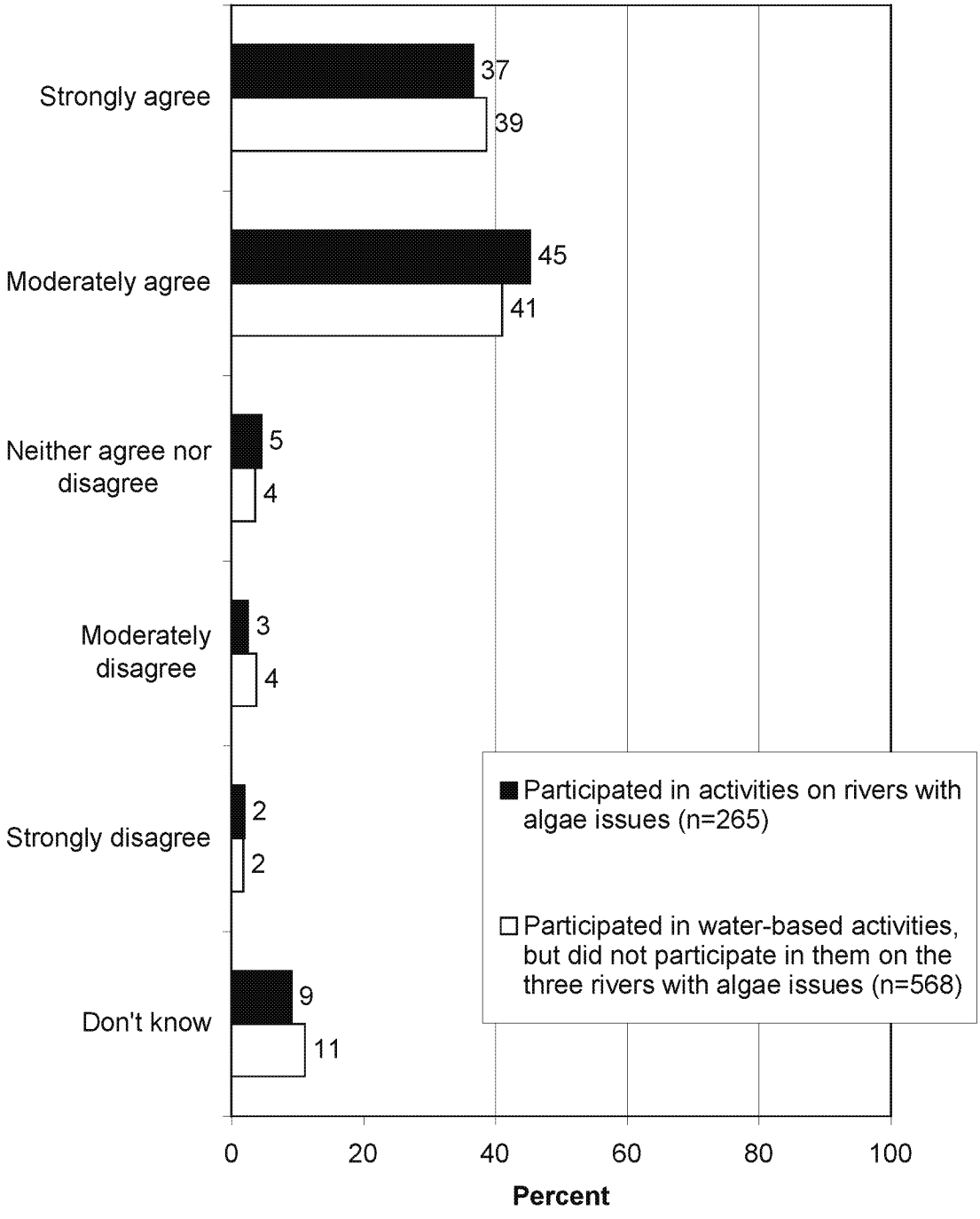
Q60. The current algae levels in West Virginia waters do not bother me when participating in water activities. (Asked of those who participated in at least one activity on or in West Virginia waters in the past 2 years.)



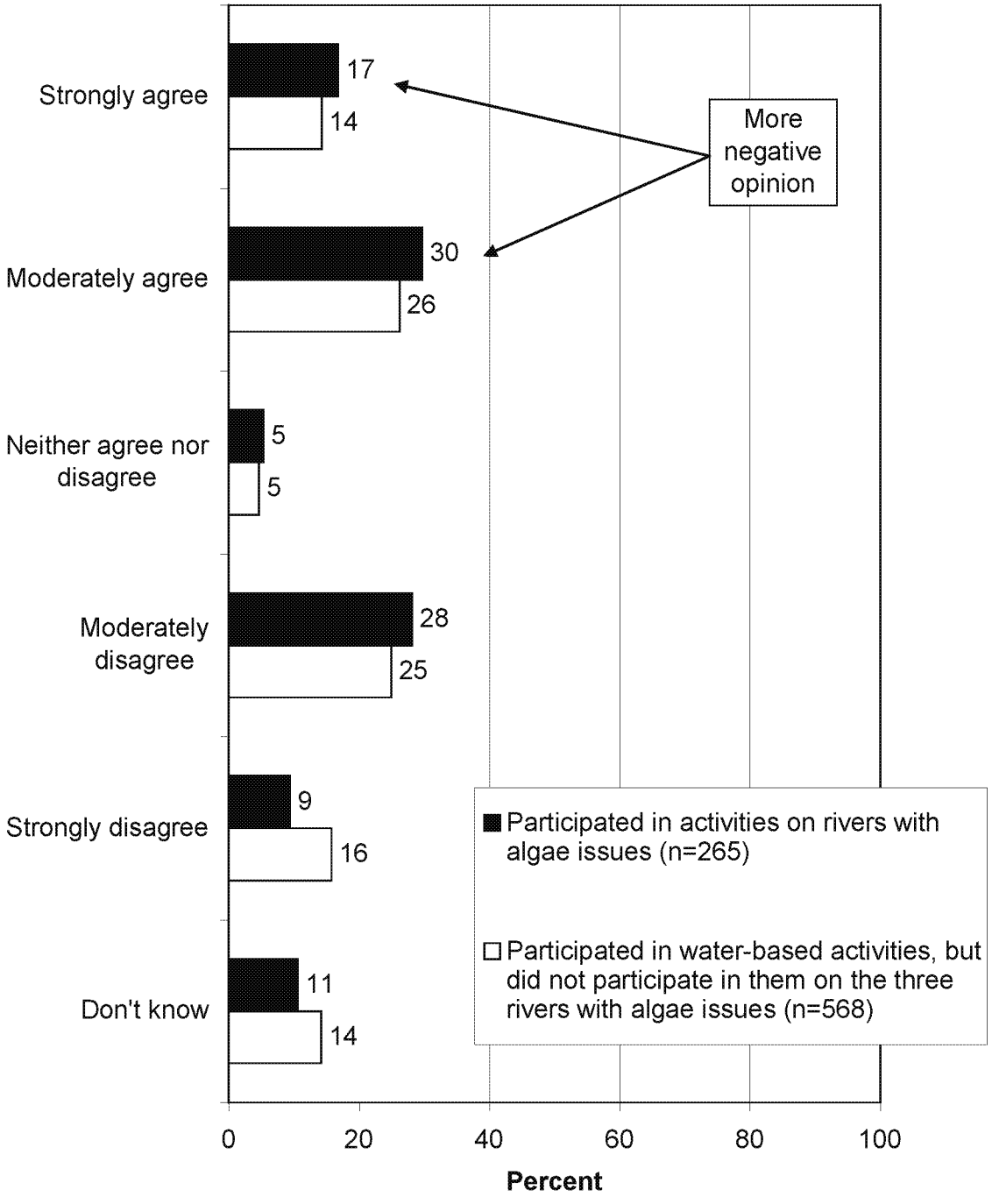
Q61. Algae causes safety hazards for people participating in activities on or in West Virginia waters.



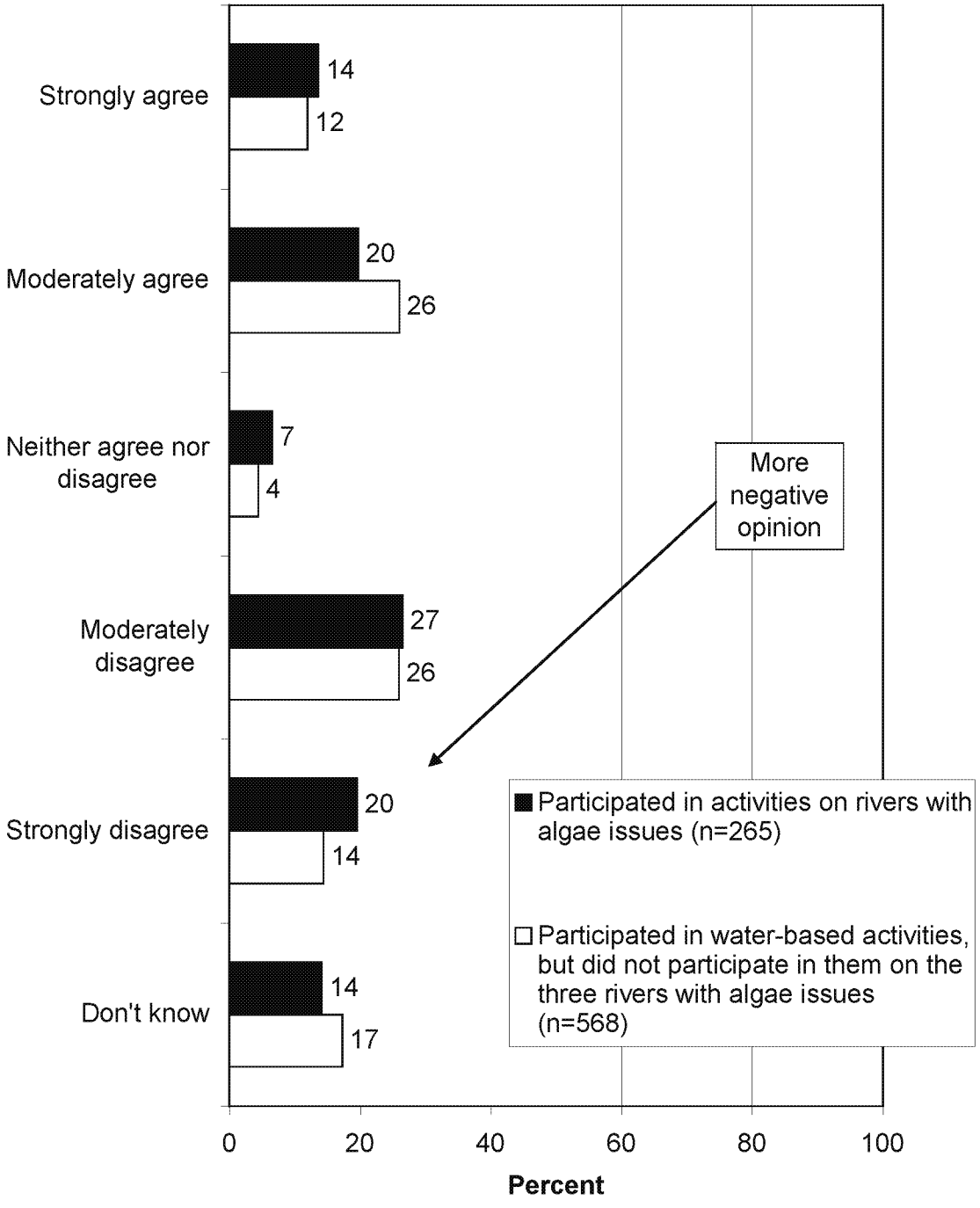
Q62. Algae is beneficial for the ecosystem in some situations.



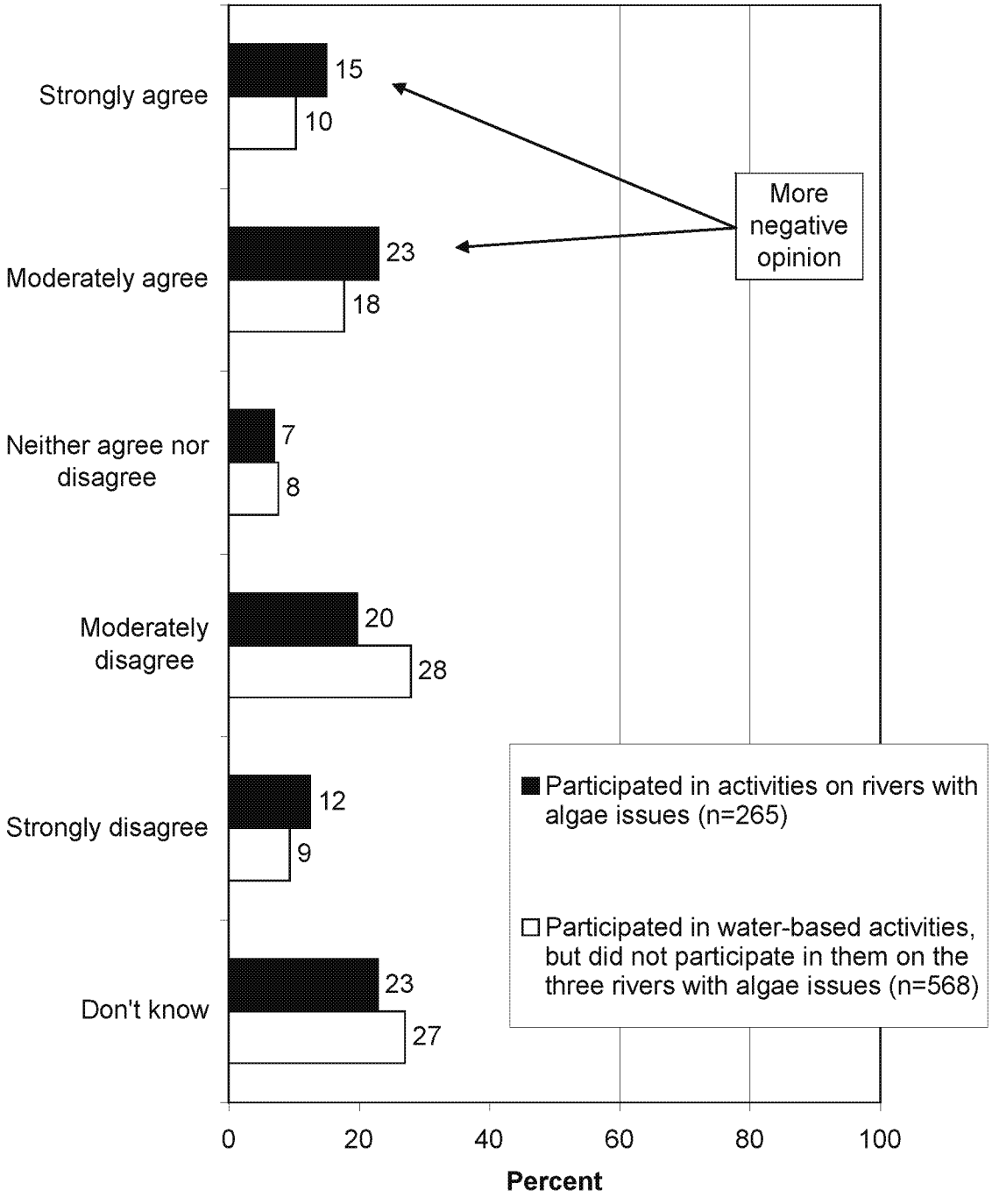
Q63. Algae makes natural public waters unhealthy for fish and plant life.



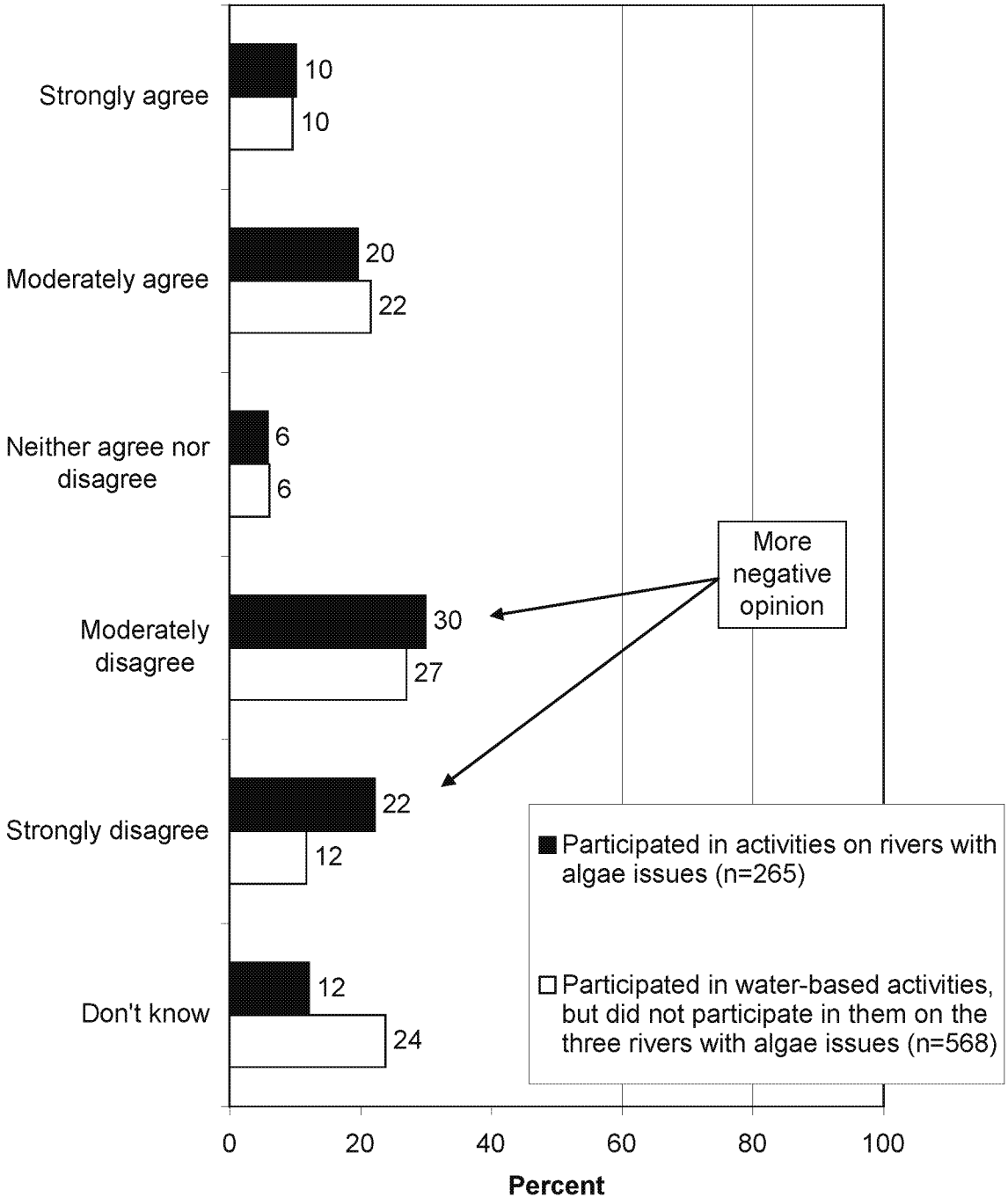
Q64. Algae in natural public waters is NOT a health hazard for people.



Q66. Algae is a problem in West Virginia. (Asked of randomly selected half of sample.)

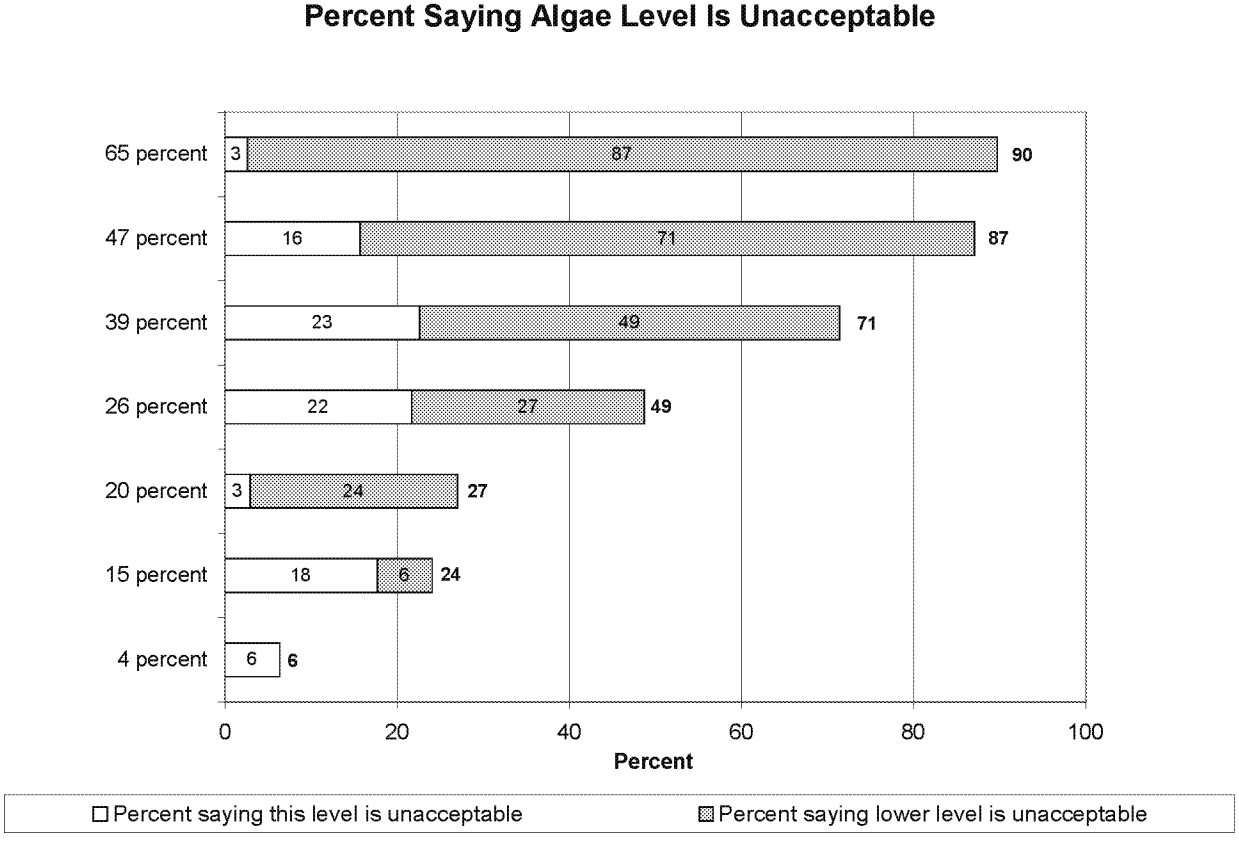


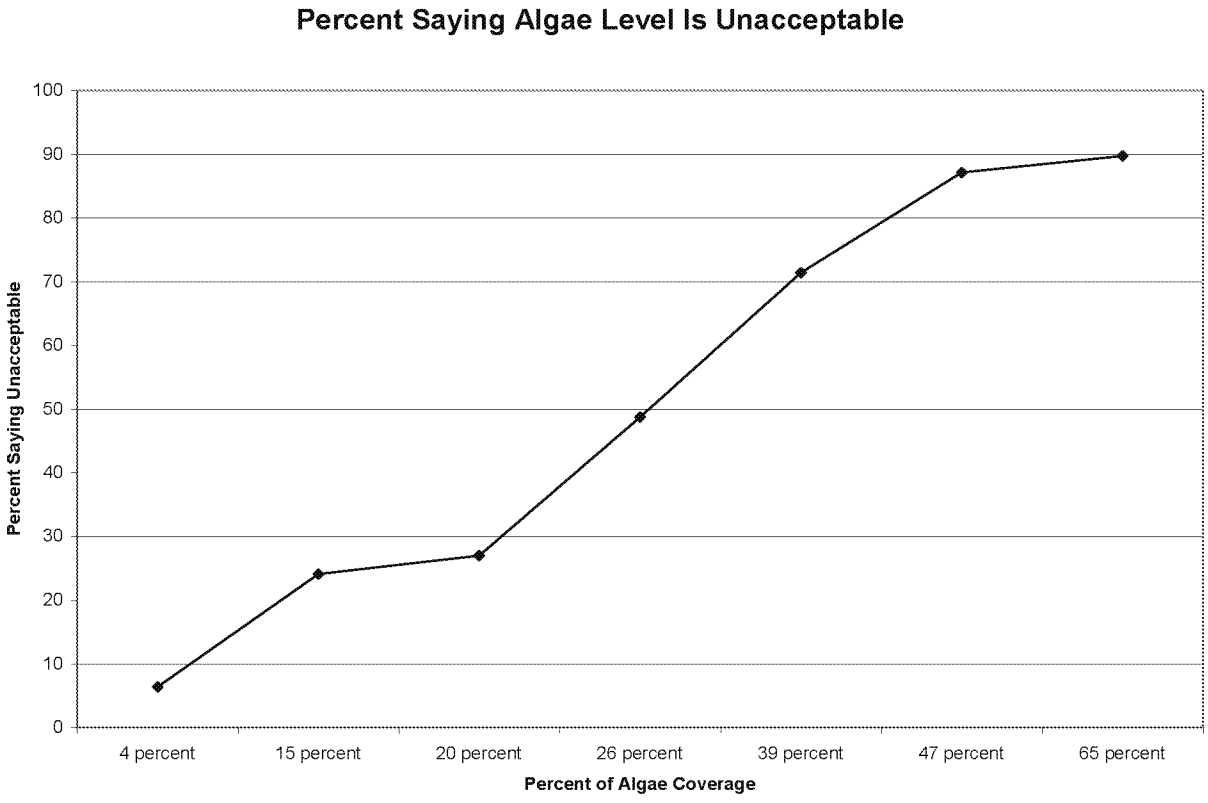
Q67. Algae is NOT a problem in West Virginia. (Asked of randomly selected half of sample.)



LEVELS OF ACCEPTANCE OF ALGAE

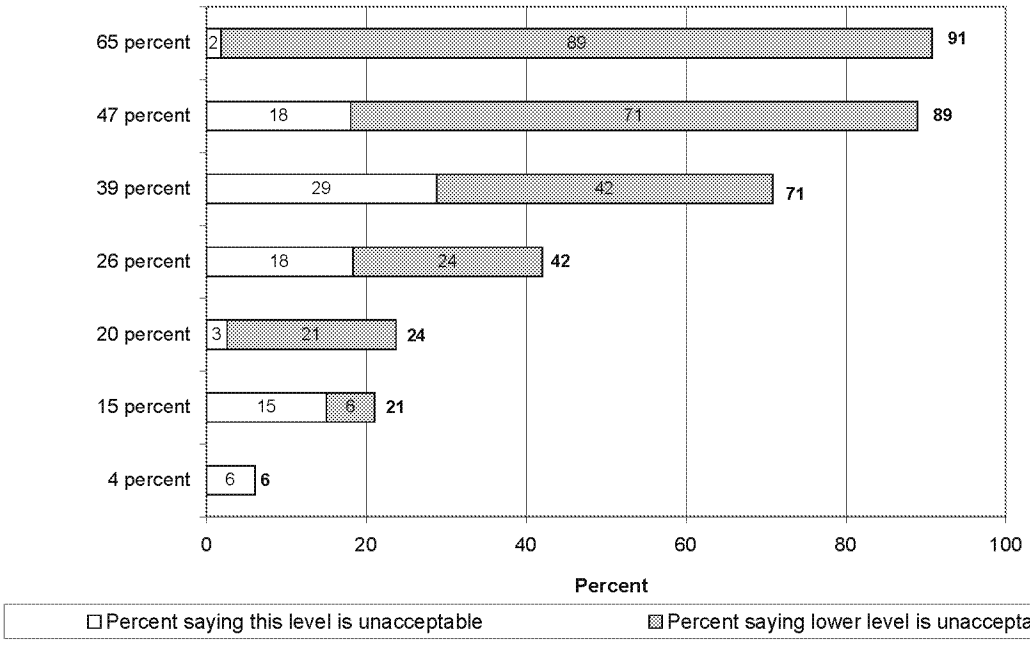
- The primary focus of the survey was to help determine the level of tolerance West Virginia residents have regarding algae in the state's natural waters. As discussed in the methodology, respondents examined photographs that showed varying levels of algae cover to determine at which point the level becomes unacceptable to them. The photograph that shows 20 percent coverage has only about a quarter of respondents (27%) thinking that this amount is unacceptable. However, the next photograph, showing 26 percent coverage, has nearly half of respondents (49%) thinking that the level is unacceptable. This suggests that waters with any more than a quarter coverage will be unacceptable to a majority of residents. A line graph on the following page illustrates this in addition to the stacked bar graph below.



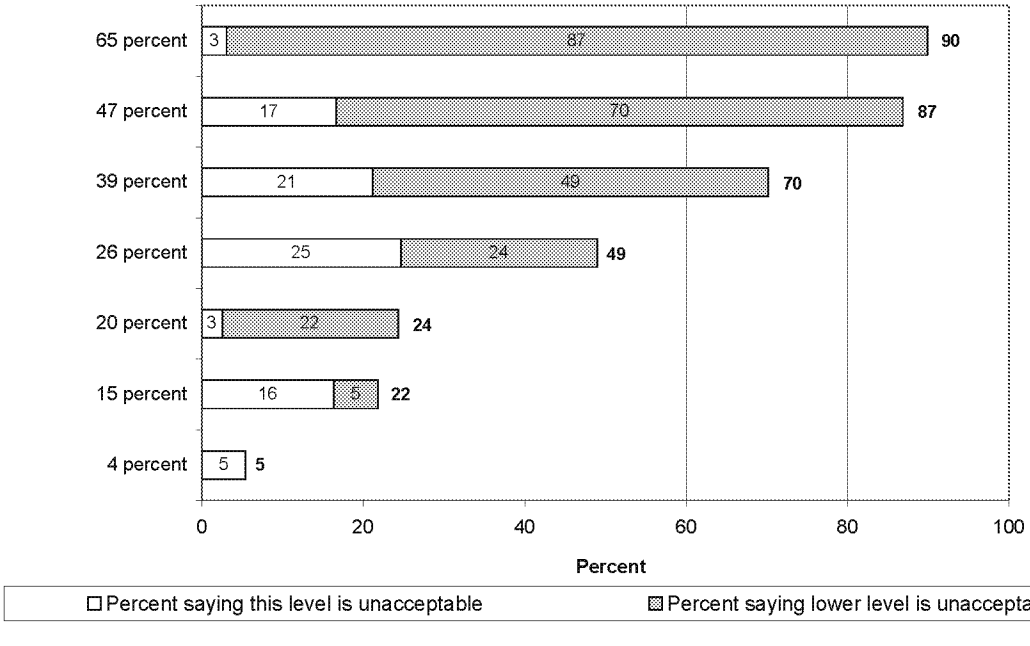

Percent Saying Algae Level Is Unacceptable
Percent Saying Unacceptable
100
90
80
70
60
50
40
30
20
10
0
4 percent
15 percent
20 percent
26 percent
39 percent
47 percent
65 percent
Percent of Algae Coverage

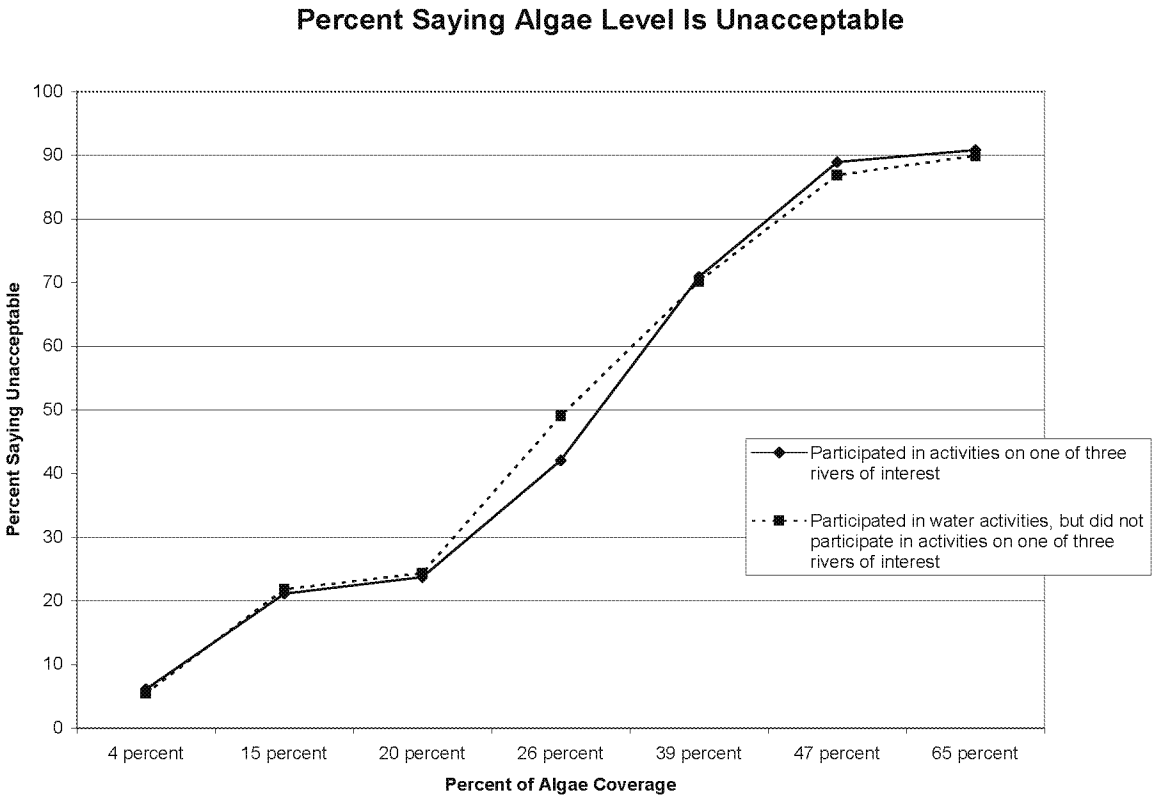
- The above graphs, which show all respondents, were also run among specific activity groups and specific demographic groups, as shown in the graphs that follow (note that groups might overlap in that, for instance, a person who fished may also have swam or waded):
  - Among those who participated in water-based activities on one of the three rivers of interest.
  - Among those who participated in water-based activities, but not on one of the three rivers of interest.
  - Among those who fished.
  - Among those who swam or waded.
  - Among those who went tubing or rafting: This group had a relatively low tolerance of algae, particularly those whose greatest participation was in tubing or rafting, compared to other groups.
  - Among those who boated (other than tubing or rafting) or used a personal watercraft: This group had a relatively low tolerance of algae, particularly those whose greatest participation was in this type of boating, compared to other groups.
  - Among those who walked along the bank or shore: This group had a relatively low tolerance of algae, particularly those whose greatest participation was in walking along a bank or shore, compared to other groups.
  - Among those who waterskied or wakeboarded.
  - Among those who did not participate in any of the listed water-based recreation: This group had a relatively low tolerance of algae, compared to the other groups.
  - Among those under the median age of respondents.
  - Among those who are the median age or older: This group had a lower tolerance of algae than did younger residents.
  - Among males.
  - Among females: This group had a lower tolerance of algae than did males.

Percent Saying Algae Level Is Unacceptable
(Among those who participated in any activities in or on the three rivers of interest in the past 12 months.)

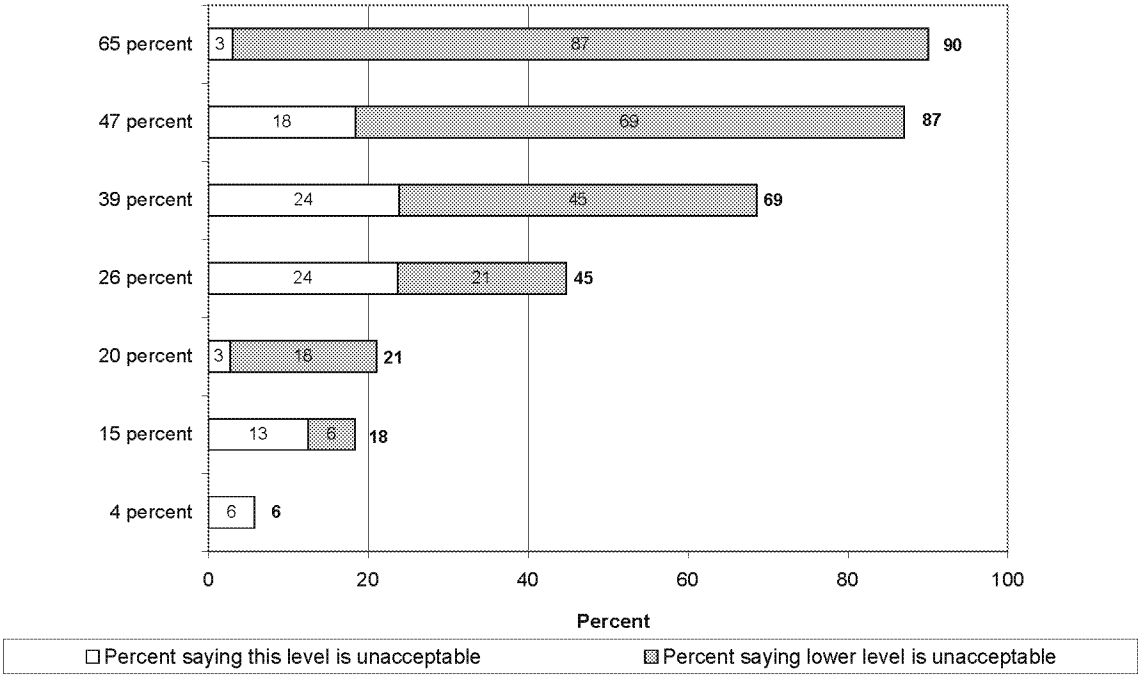


Percent Saying Algae Level Is Unacceptable
(Among those who participated in activities in or on West Virginia waters in the past 12 months, but did not participate on or in the three rivers of interest.)

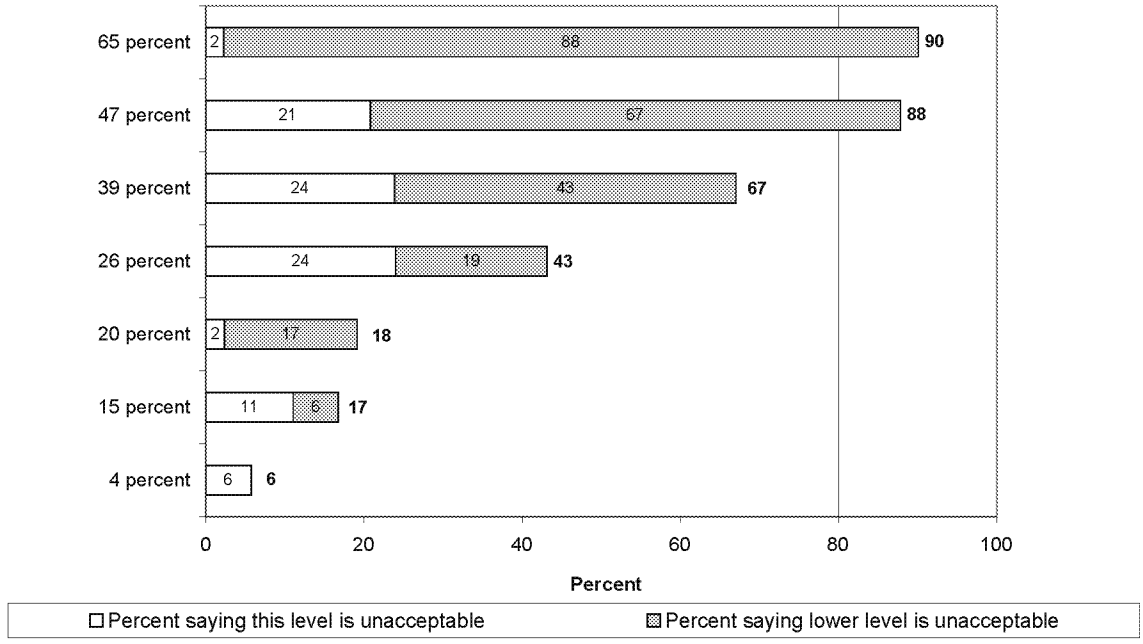



Percent Saying Algae Level Is Unacceptable
Percent Saying Unacceptable
100
90
80
70
60
50
40
30
20
10
0
4 percent
15 percent
20 percent
26 percent
39 percent
47 percent
65 percent
Percent of Algae Coverage
Participated in activities on one of three rivers of interest
Participated in water activities, but did not participate in activities on one of three rivers of interest

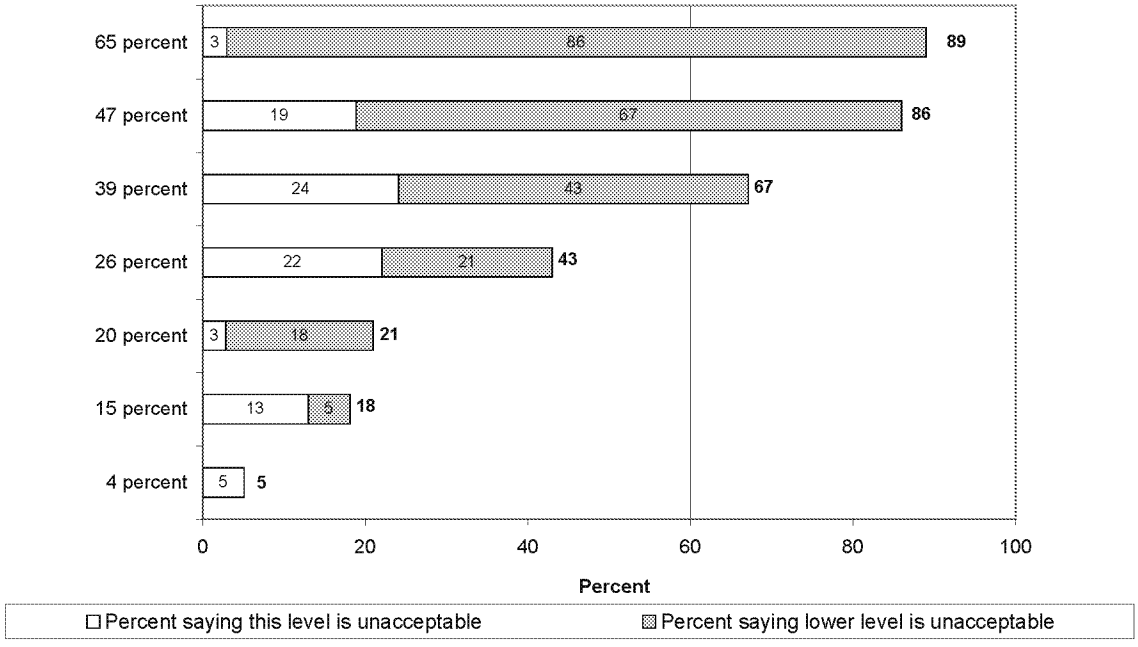
Percent Saying Algae Level Is Unacceptable
(Among those who fished in West Virginia in the past 2 years.)



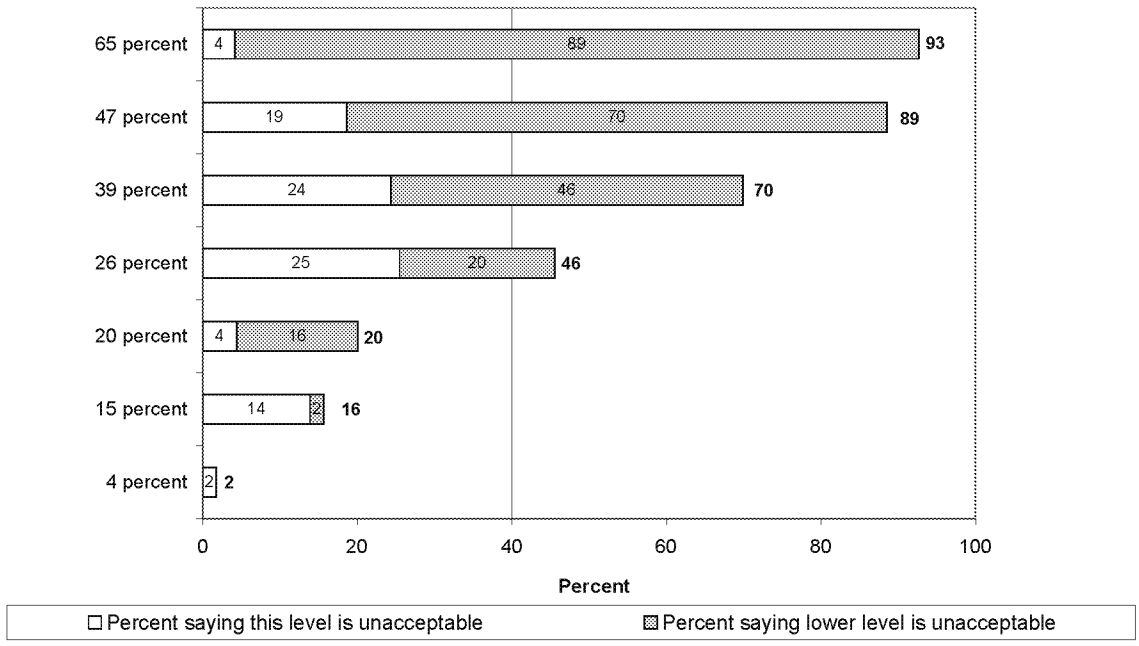
Percent Saying Algae Level Is Unacceptable
(Among those whose greatest participation is in fishing in or on West Virginia waters in the past 12 months.)



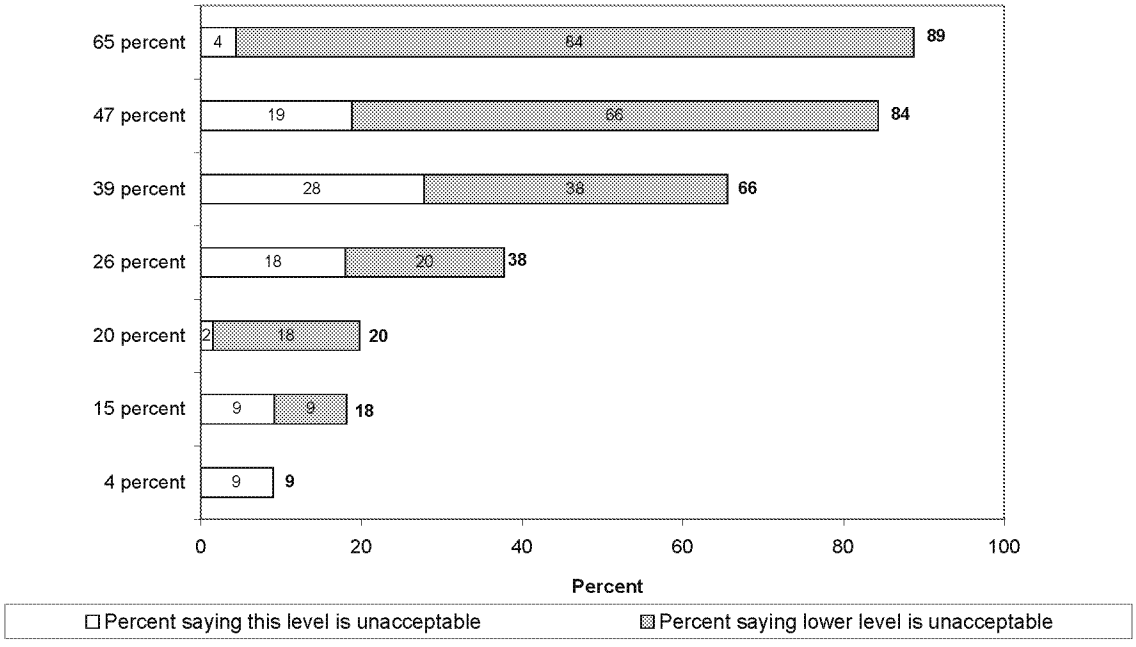
Percent Saying Algae Level Is Unacceptable (Among those who swam or waded in West Virginia waters in the past 2 years.)



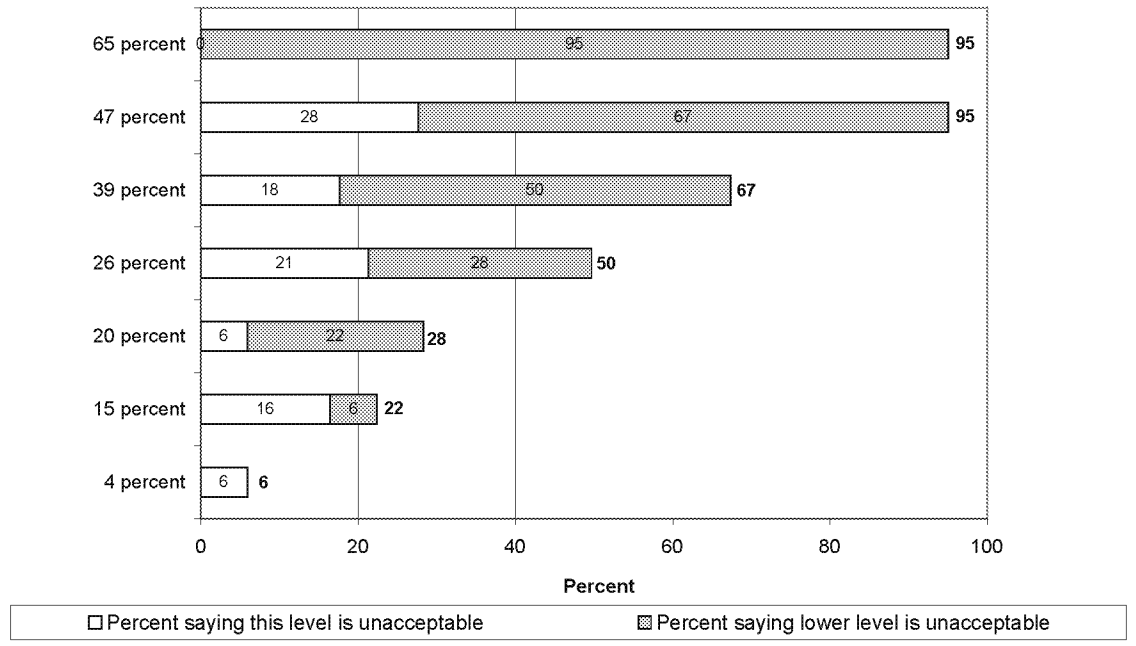
Percent Saying Algae Level Is Unacceptable (Among those whose greatest participation is in swimming or wading in or on West Virginia waters in the past 2 years.)



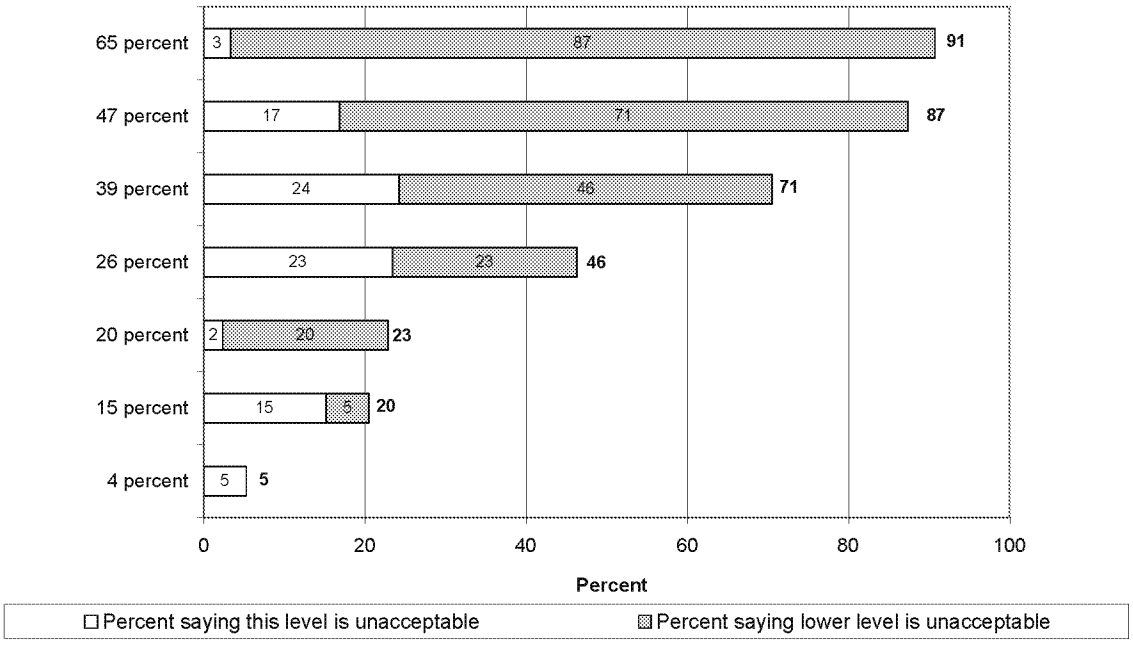
Percent Saying Algae Level Is Unacceptable
(Among those who tubed or rafted in West Virginia waters in the past 2 years.)



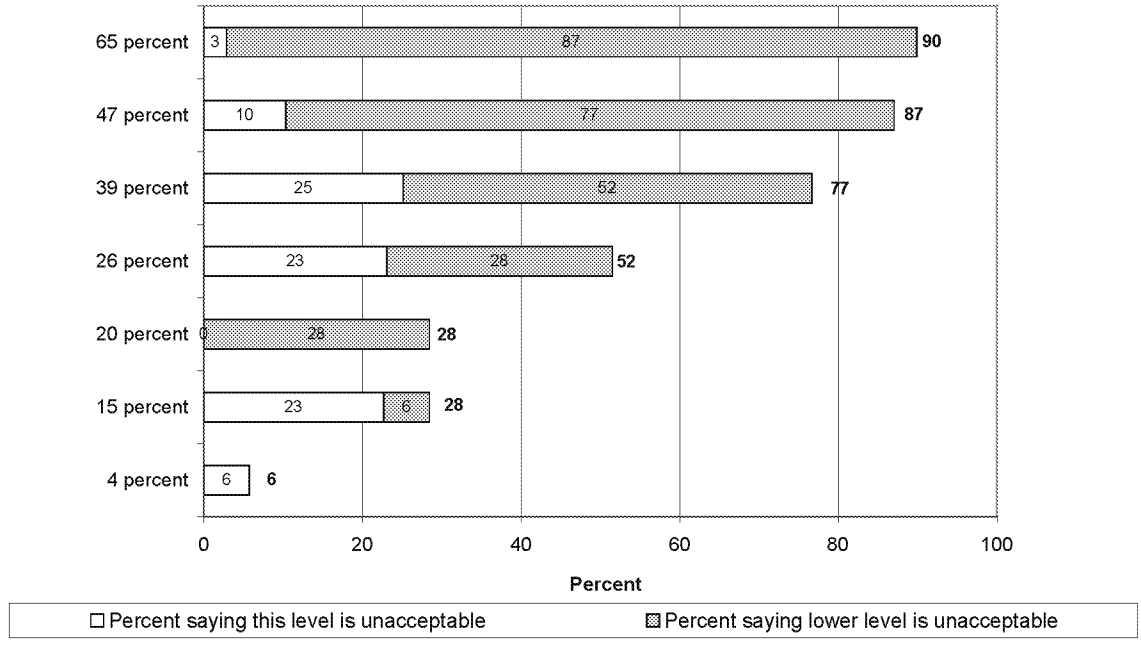
Percent Saying Algae Level Is Unacceptable
(Among those whose greatest participation is in tubing or rafting in West Virginia waters in the past 2 years.)



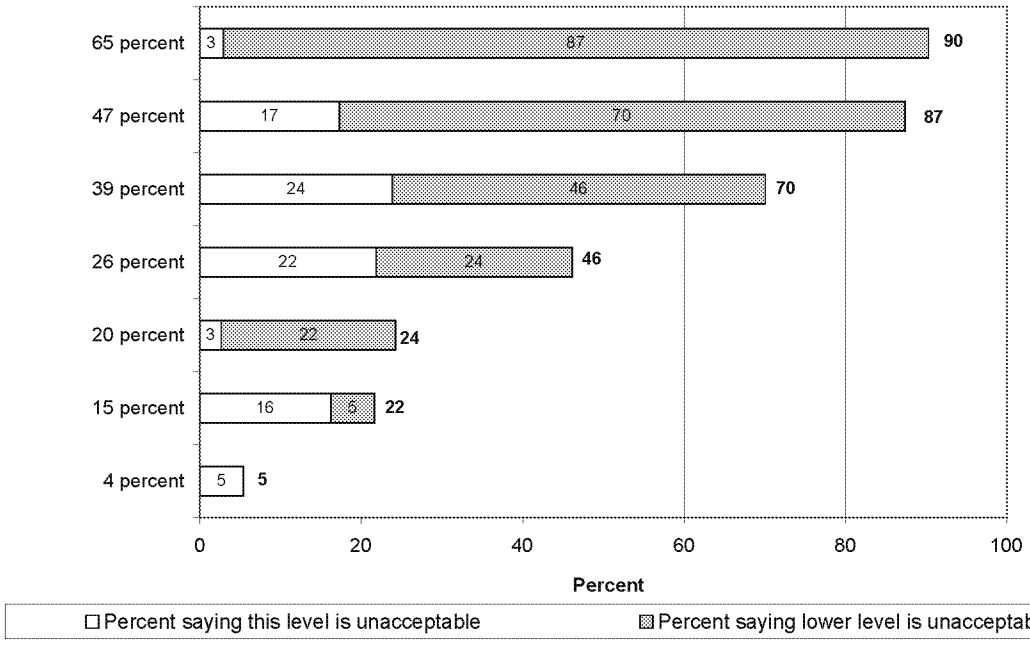
Percent Saying Algae Level Is Unacceptable
(Among those who boated (other than tubing or rafting) or used a personal watercraft in West Virginia waters in the past 2 years.)



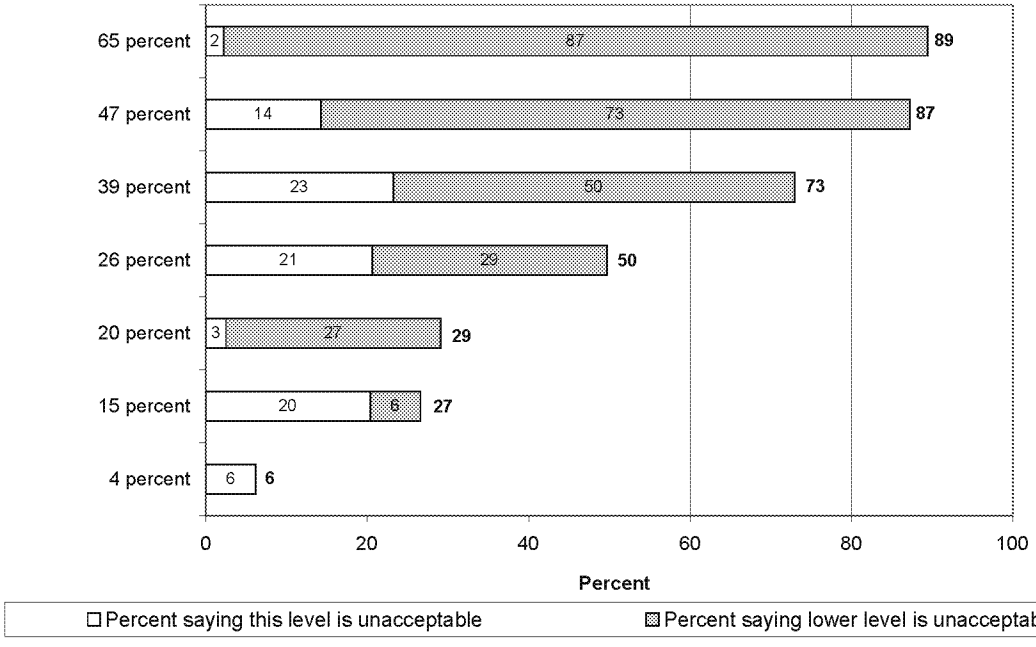
Percent Saying Algae Level Is Unacceptable
(Among those whose greatest participation is in boating (other than tubing or rafting) or personal watercraft use in West Virginia waters in the past 2 years.)



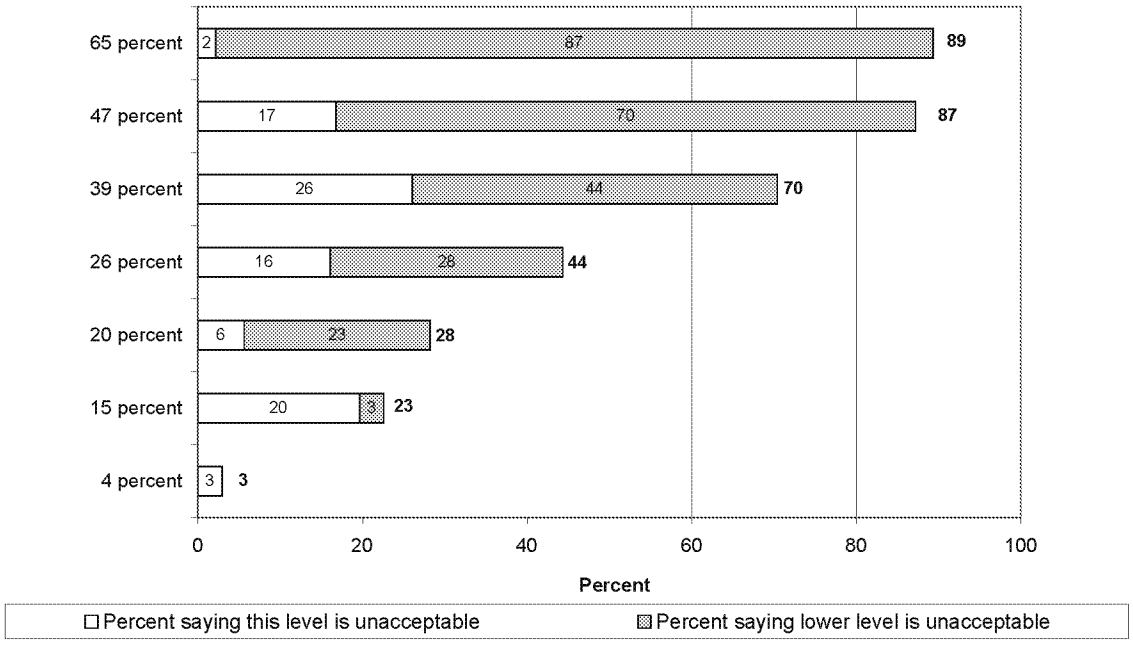
Percent Saying Algae Level Is Unacceptable
(Among those who walked along a bank or shore in West Virginia in the past 2 years.)



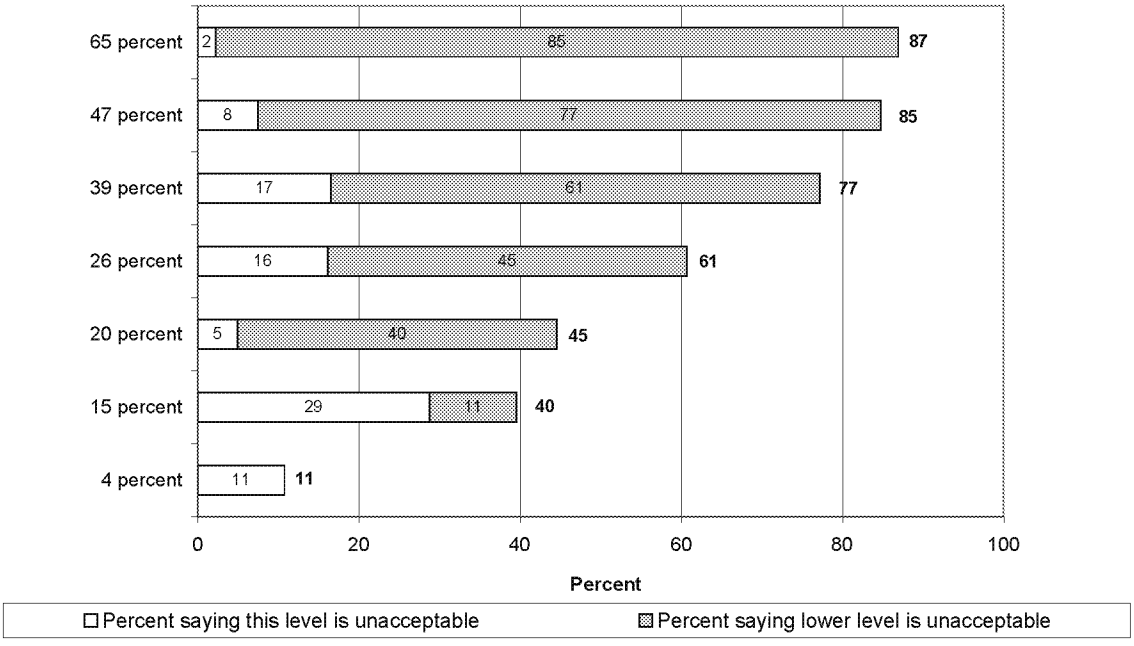
Percent Saying Algae Level Is Unacceptable
(Among those whose greatest participation is in walking along a bank or shore near West Virginia waters in the past 2 years.)

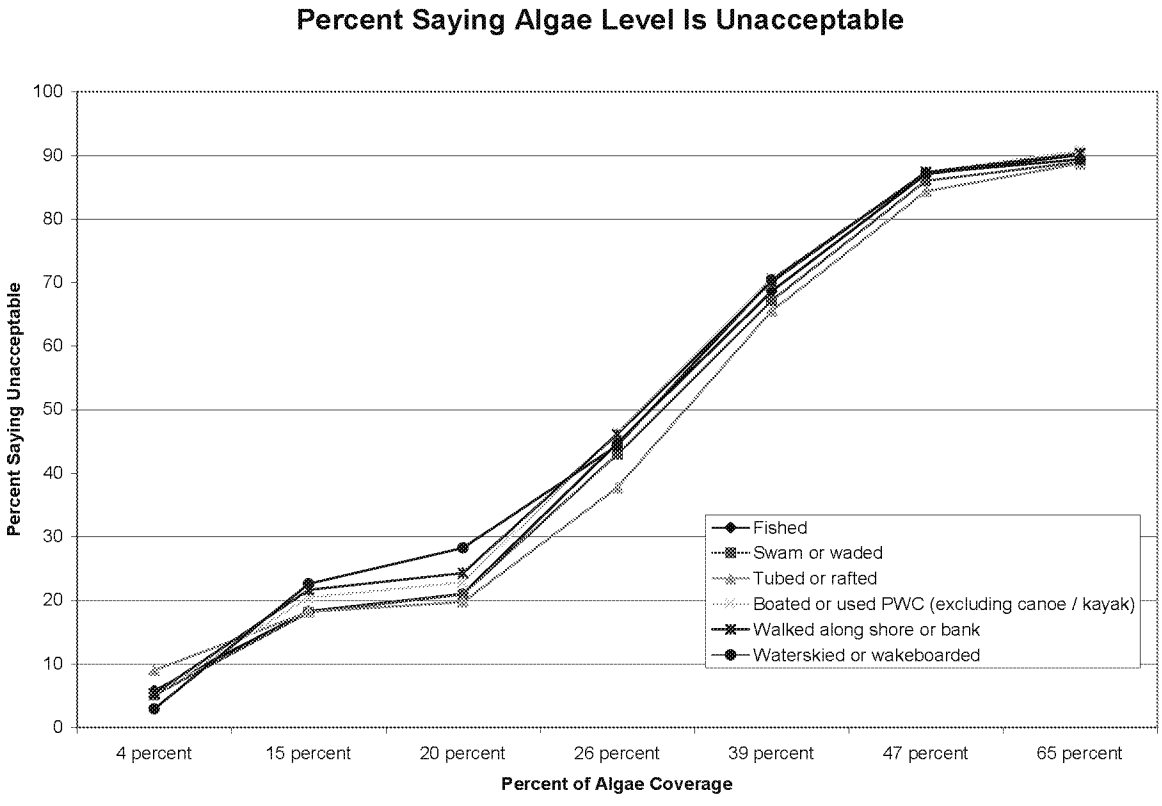


Percent Saying Algae Level Is Unacceptable (Among those who waterskied or wakeboarded in West Virginia in the past 2 years.)

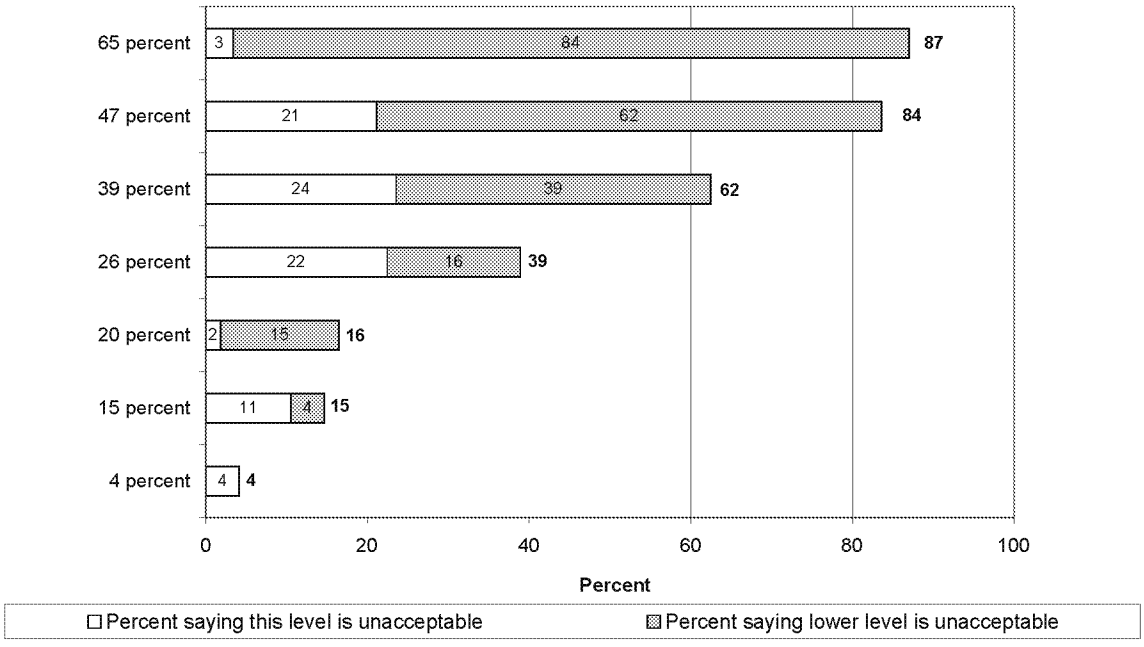


Percent Saying Algae Level Is Unacceptable (Among those who did not participate in any activities in or on West Virginia waters in the past 2 years.)

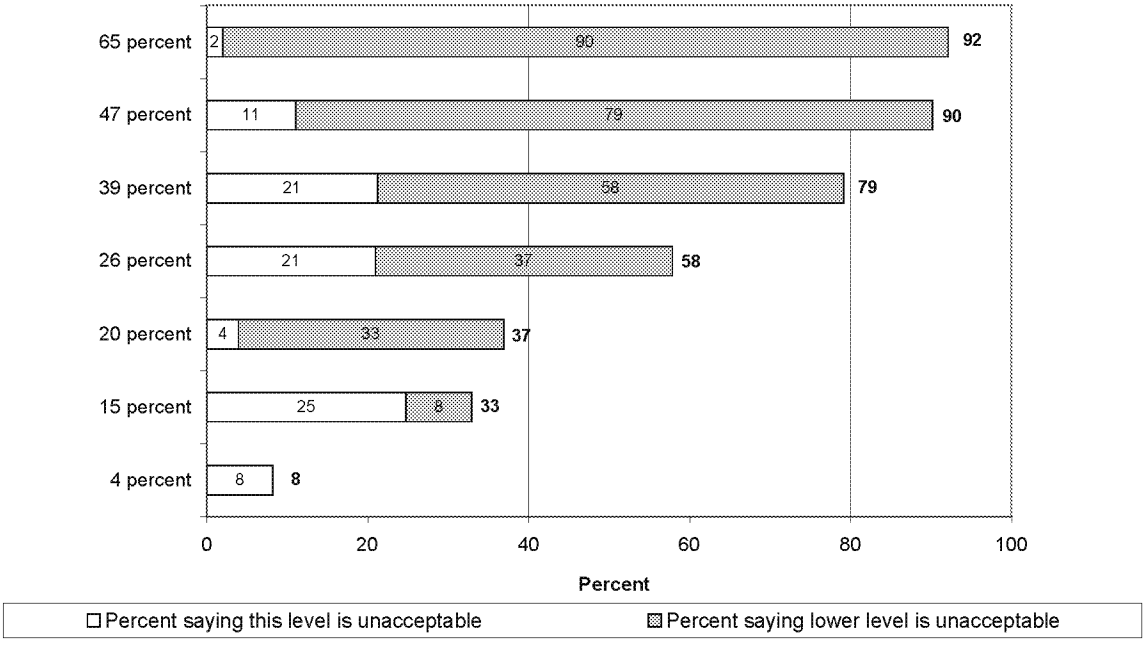



Percent Saying Algae Level Is Unacceptable
Percent Saying Unacceptable
100
90
80
70
60
50
40
30
20
10
0
4 percent
15 percent
20 percent
26 percent
39 percent
47 percent
65 percent
Percent of Algae Coverage
Fished
Swam or waded
Tubed or rafted
Boated or used PWC (excluding canoe / kayak)
Walked along shore or bank
Waterskied or wakeboarded

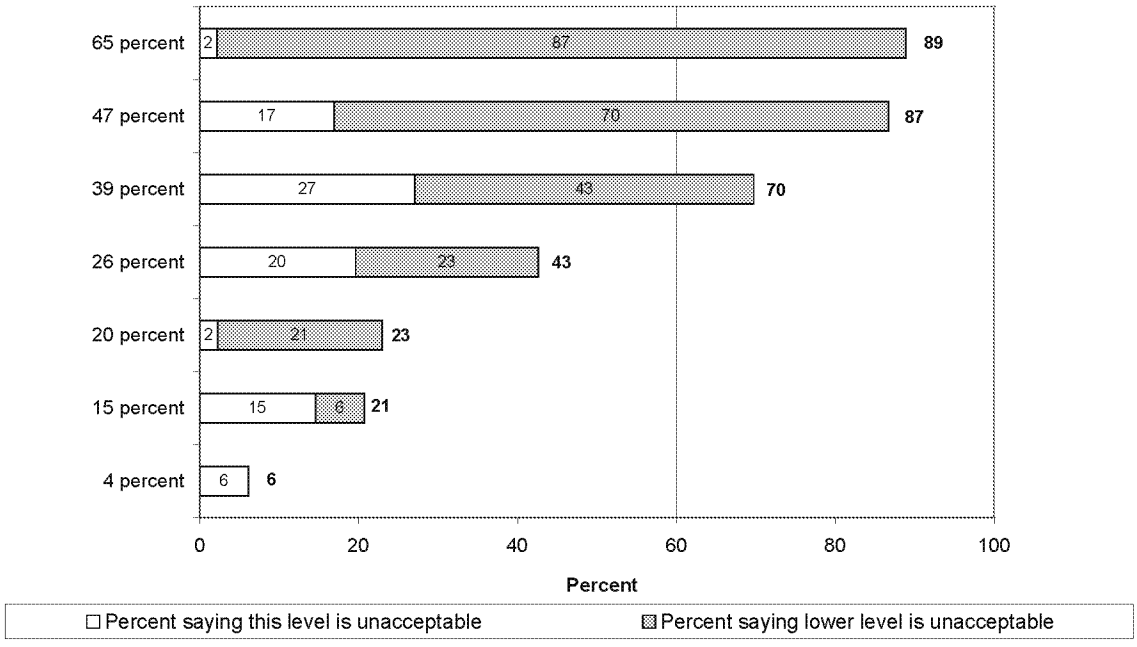
Percent Saying Algae Level Is Unacceptable
(Among those under the median age of 49.)



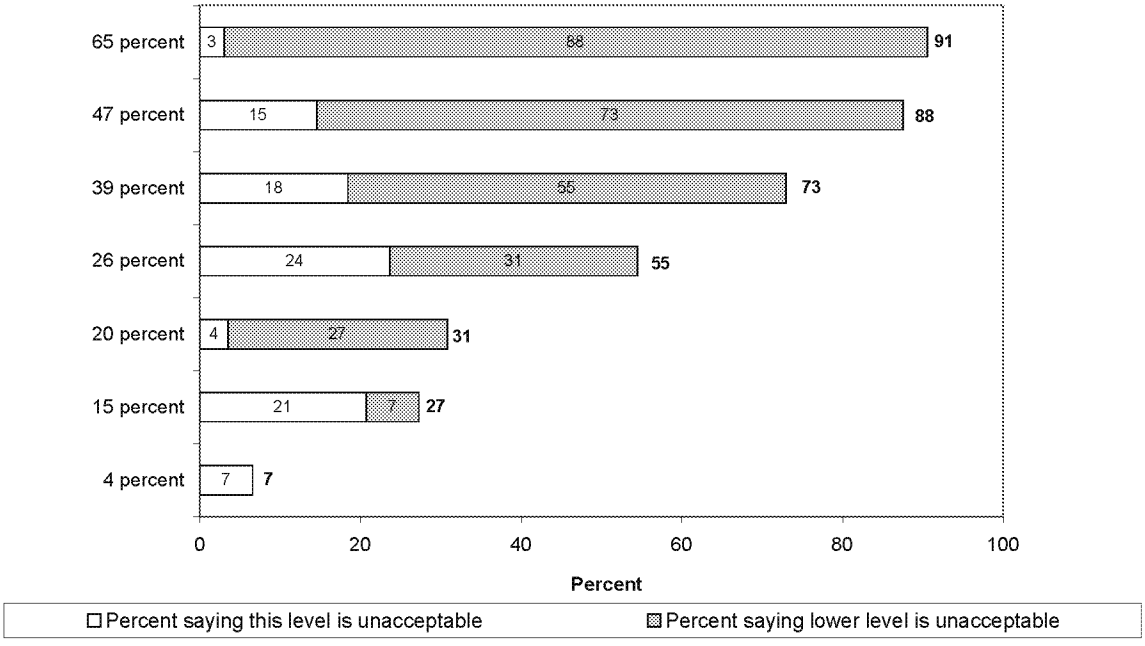
Percent Saying Algae Level Is Unacceptable
(Among those who are 49 years old or older.)

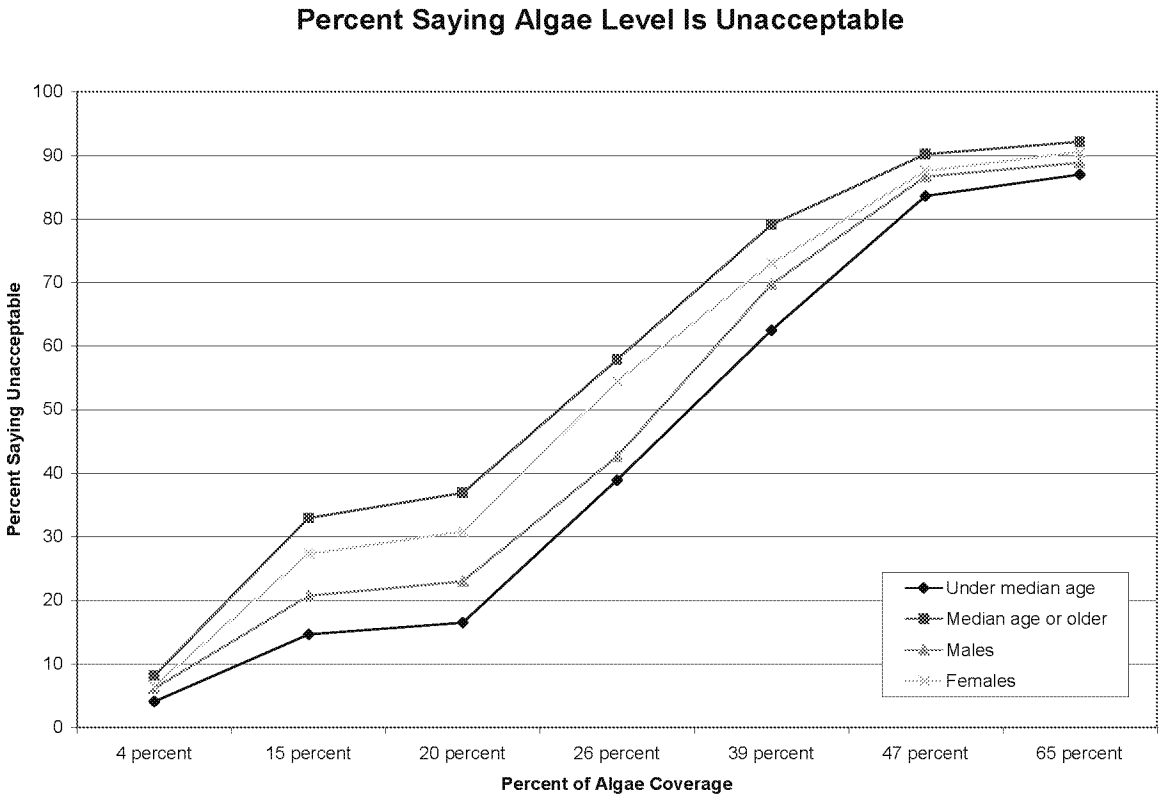


Percent Saying Algae Level Is Unacceptable (Among males.)

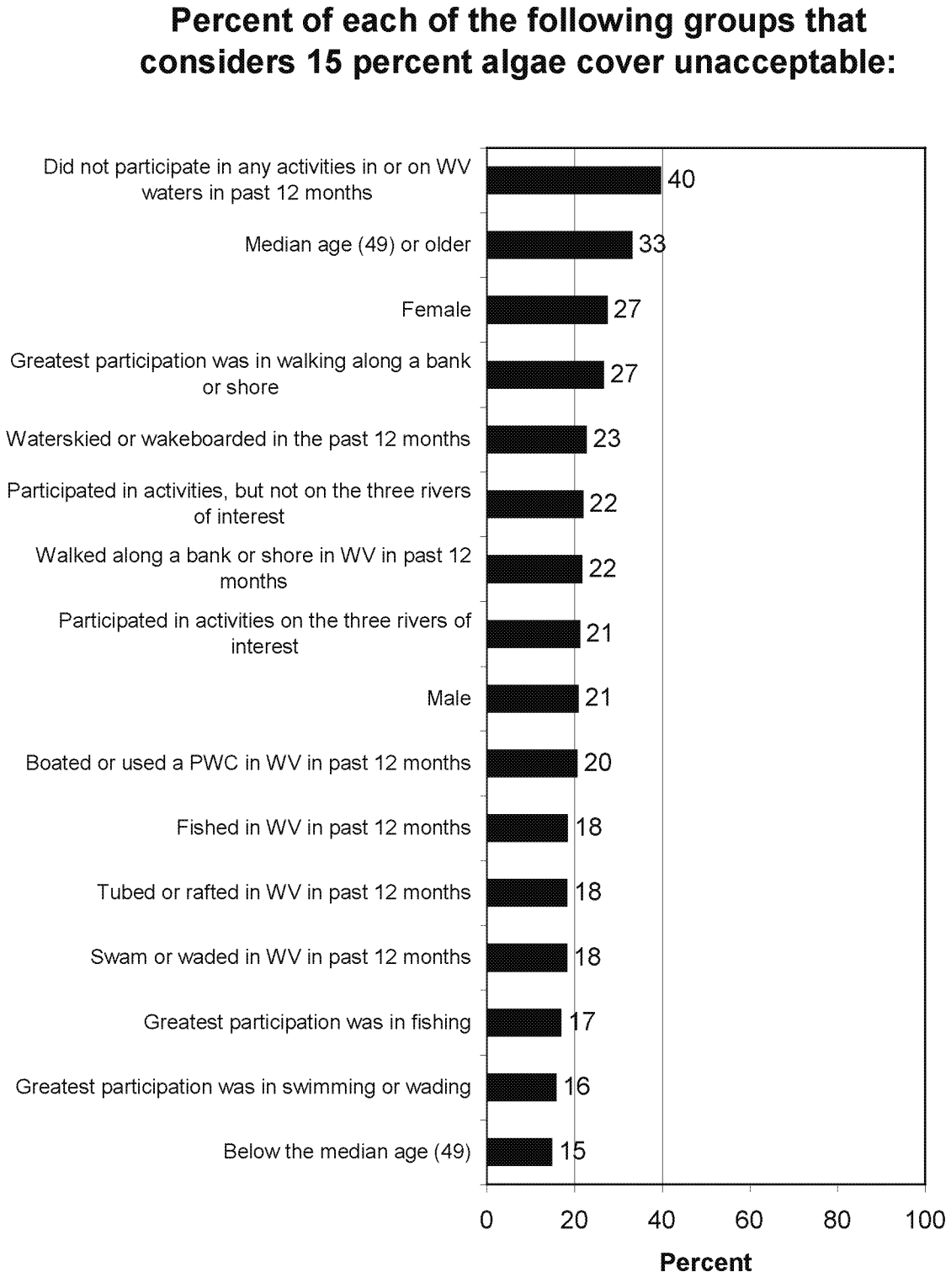


Percent Saying Algae Level Is Unacceptable (Among females.)

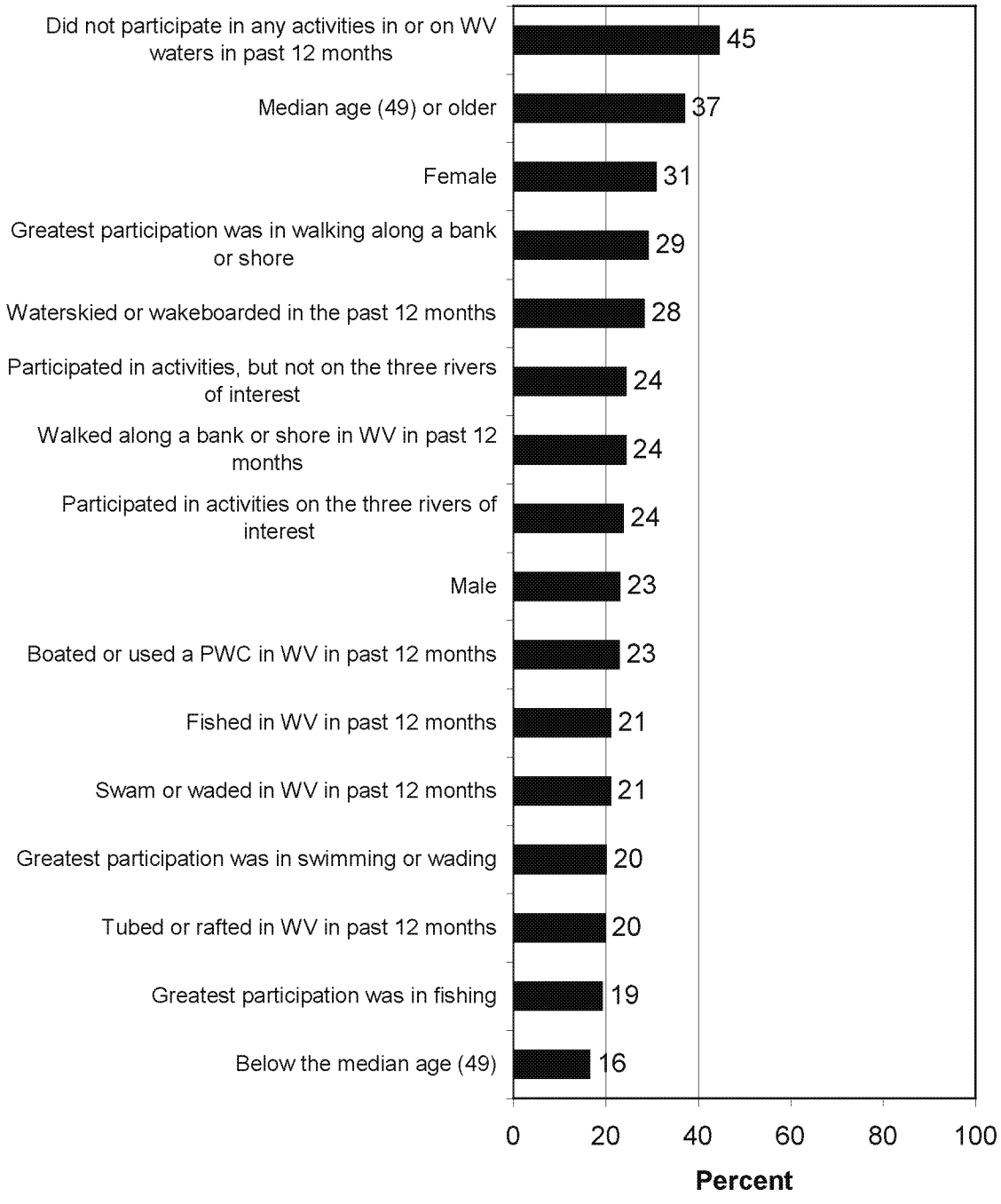


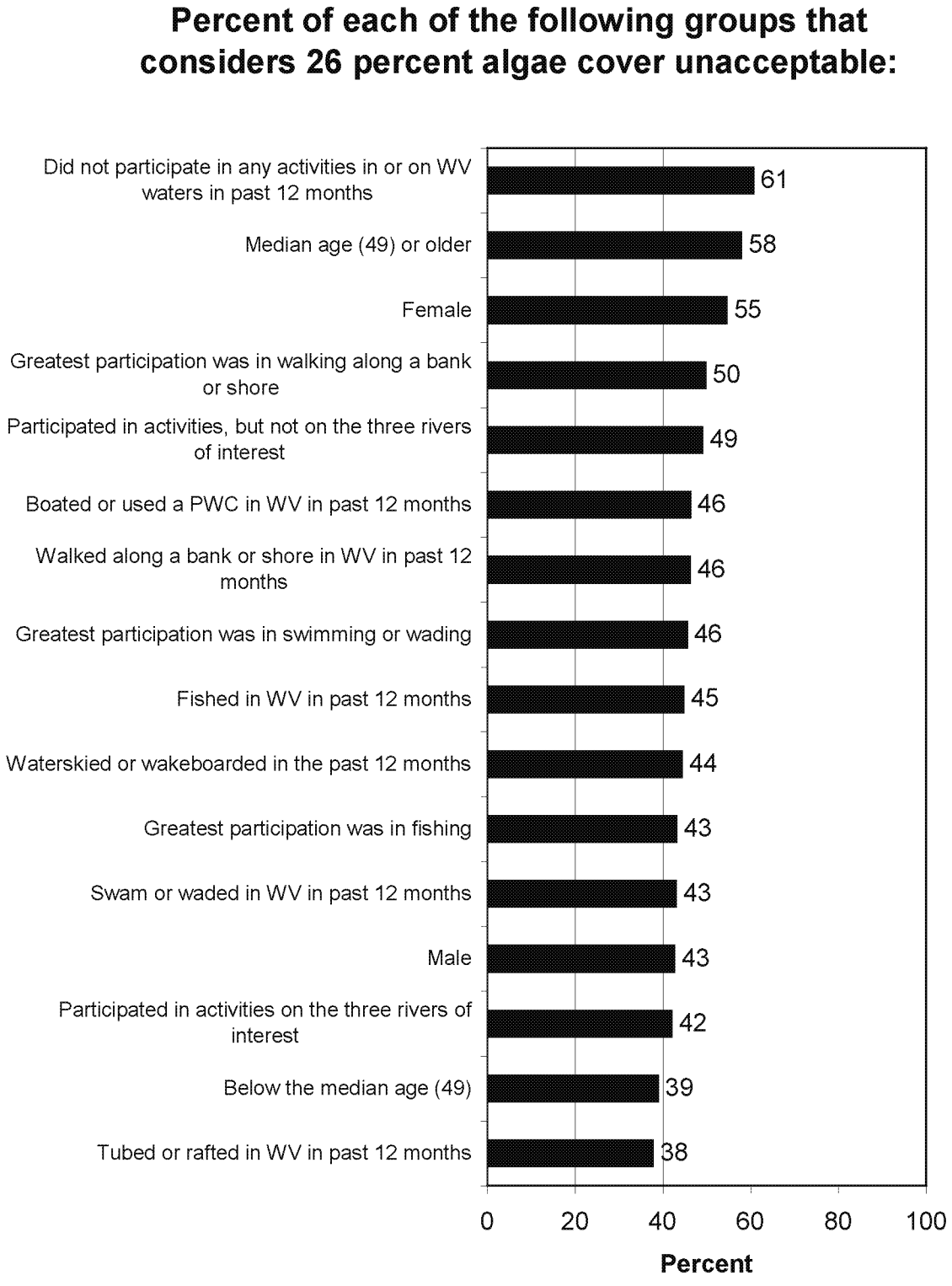

Percent Saying Algae Level Is Unacceptable
Percent Saying Unacceptable
100
90
80
70
60
50
40
30
20
10
0
4 percent
15 percent
20 percent
26 percent
39 percent
47 percent
65 percent
Percent of Algae Coverage
Under median age
Median age or older
Males
Females

- A final way to examine the data is to see the percentage of various groups at specific thresholds for considering algae coverage to be unacceptable. Four graphs are shown: the percent of various groups thinking that 15 percent algae cover is unacceptable, and the same for 20 percent, 26 percent, and 39 percent. These graphs also demonstrate that certain groups appear to have relatively less tolerance of algae: those who participated in no water-based activities, older respondents, and females.

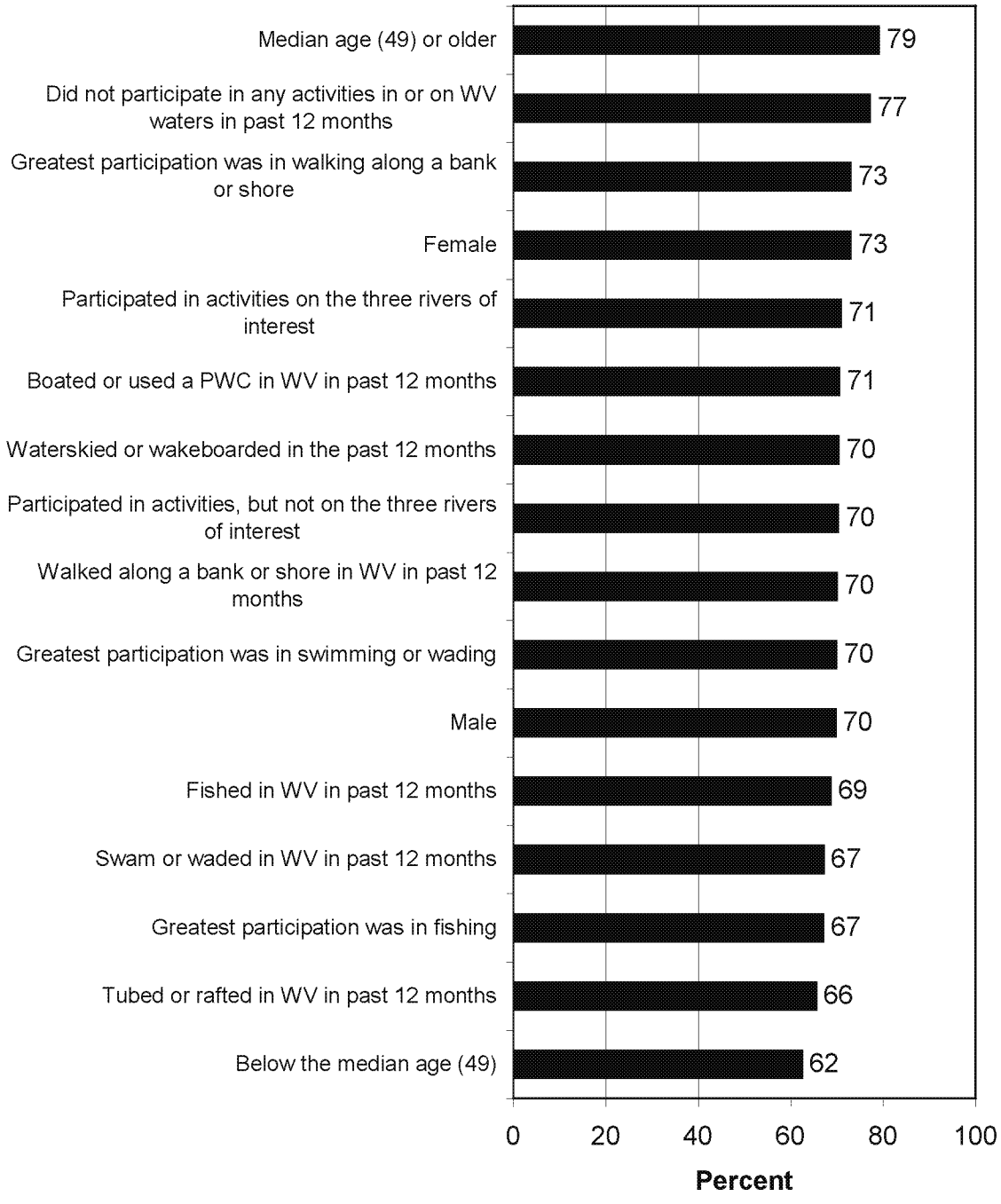

Percent of each of the following groups that considers 15 percent algae cover unacceptable:
Did not participate in any activities in or on WV waters in past 12 months
40
Median age (49) or older
33
Female
27
Greatest participation was in walking along a bank or shore
27
Waterskied or wakeboarded in the past 12 months
23
Participated in activities, but not on the three rivers of interest
22
Walked along a bank or shore in WV in past 12 months
22
Participated in activities on the three rivers of interest
21
Male
21
Boated or used a PWC in WV in past 12 months
20
Fished in WV in past 12 months
18
Tubed or rafted in WV in past 12 months
18
Swam or waded in WV in past 12 months
18
Greatest participation was in fishing
17
Greatest participation was in swimming or wading
16
Below the median age (49)
15
0
20
40
60
80
100
Percent

Percent of each of the following groups that considers 20 percent algae cover unacceptable:




Percent of each of the following groups that considers 26 percent algae cover unacceptable:
Did not participate in any activities in or on WV waters in past 12 months
61
Median age (49) or older
58
Female
55
Greatest participation was in walking along a bank or shore
50
Participated in activities, but not on the three rivers of interest
49
Boated or used a PWC in WV in past 12 months
46
Walked along a bank or shore in WV in past 12 months
46
Greatest participation was in swimming or wading
46
Fished in WV in past 12 months
45
Waterskied or wakeboarded in the past 12 months
44
Greatest participation was in fishing
43
Swam or waded in WV in past 12 months
43
Male
43
Participated in activities on the three rivers of interest
42
Below the median age (49)
39
Tubed or rafted in WV in past 12 months
38
0
20
40
60
80
100
Percent

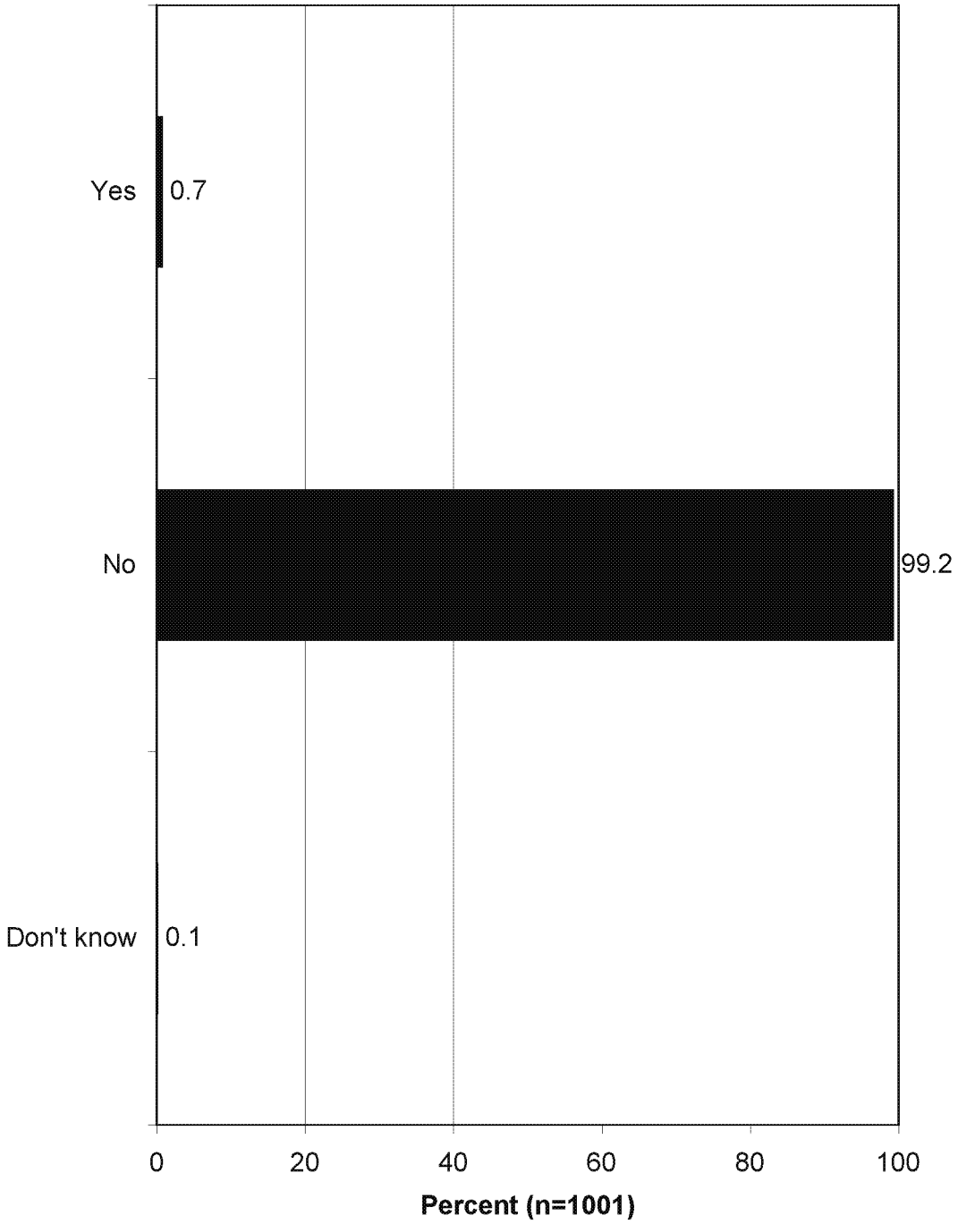
Percent of each of the following groups that considers 39 percent algae cover unacceptable:



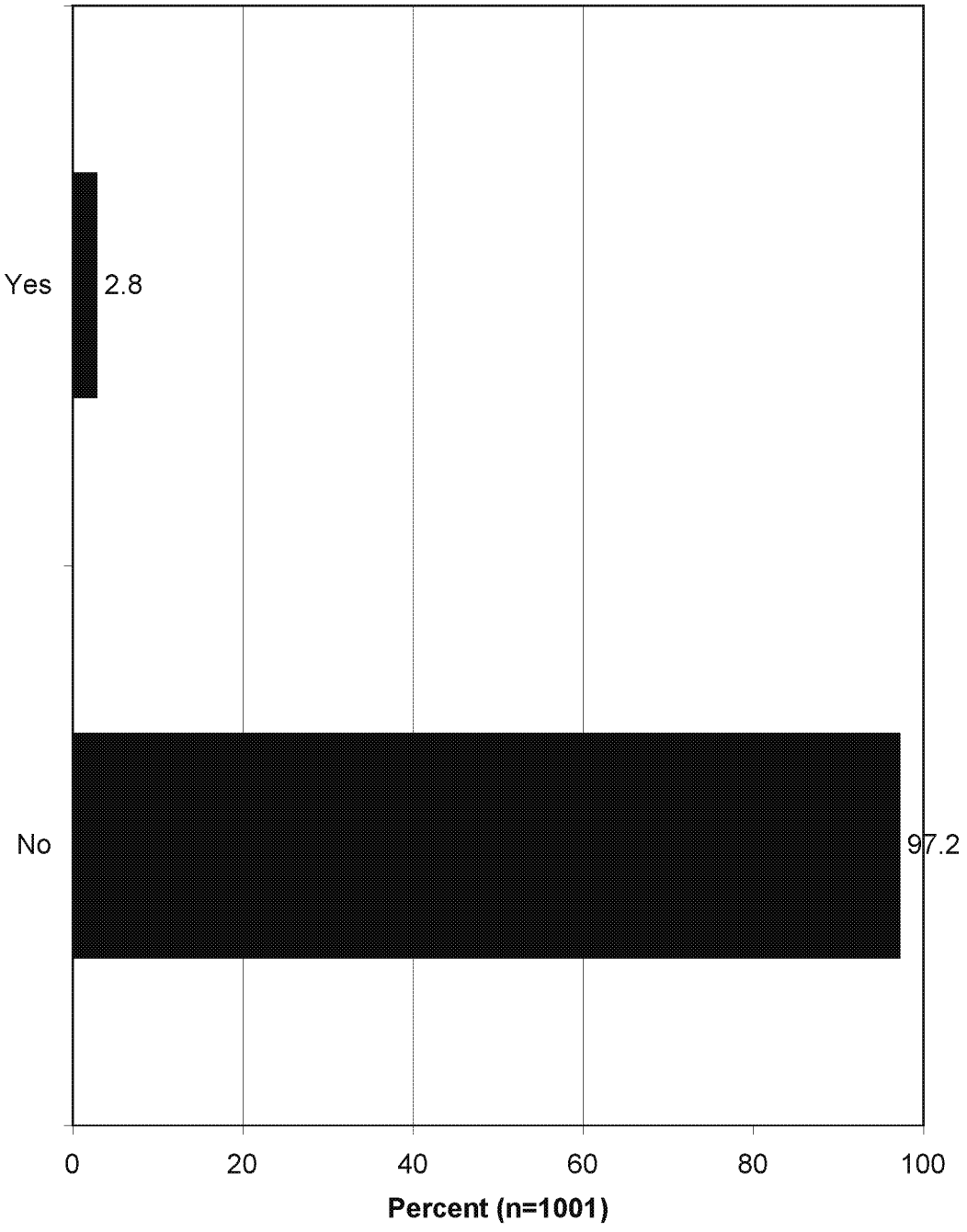
CONTACTING AGENCIES AND ORGANIZATIONS REGARDING ALGAE

- Less than 1% of West Virginia residents have contacted the DEP about algae in West Virginia waters in the past 2 years. Additionally, a little less than 3% contacted any other agency or organization about algae.
  - A follow-up question asked respondents to indicate why they had contacted the DEP or another agency or organization about algae (among those who had made contact). Most commonly, they contacted an agency or organization to obtain general information about algae, to complain about algae, or to ask specifically about safety and/or health hazards associated with algae.
  - Those who indicated that they had concerns about algae but did not indicate contacting the DEP about it were asked for their reasons for not contacting the DEP. Most commonly, it was because they did not consider algae much of a problem, because they did not know which agency to contact, did not know how to contact the DEP about it, assumed the problem was being addressed, or because they did not think it would help.

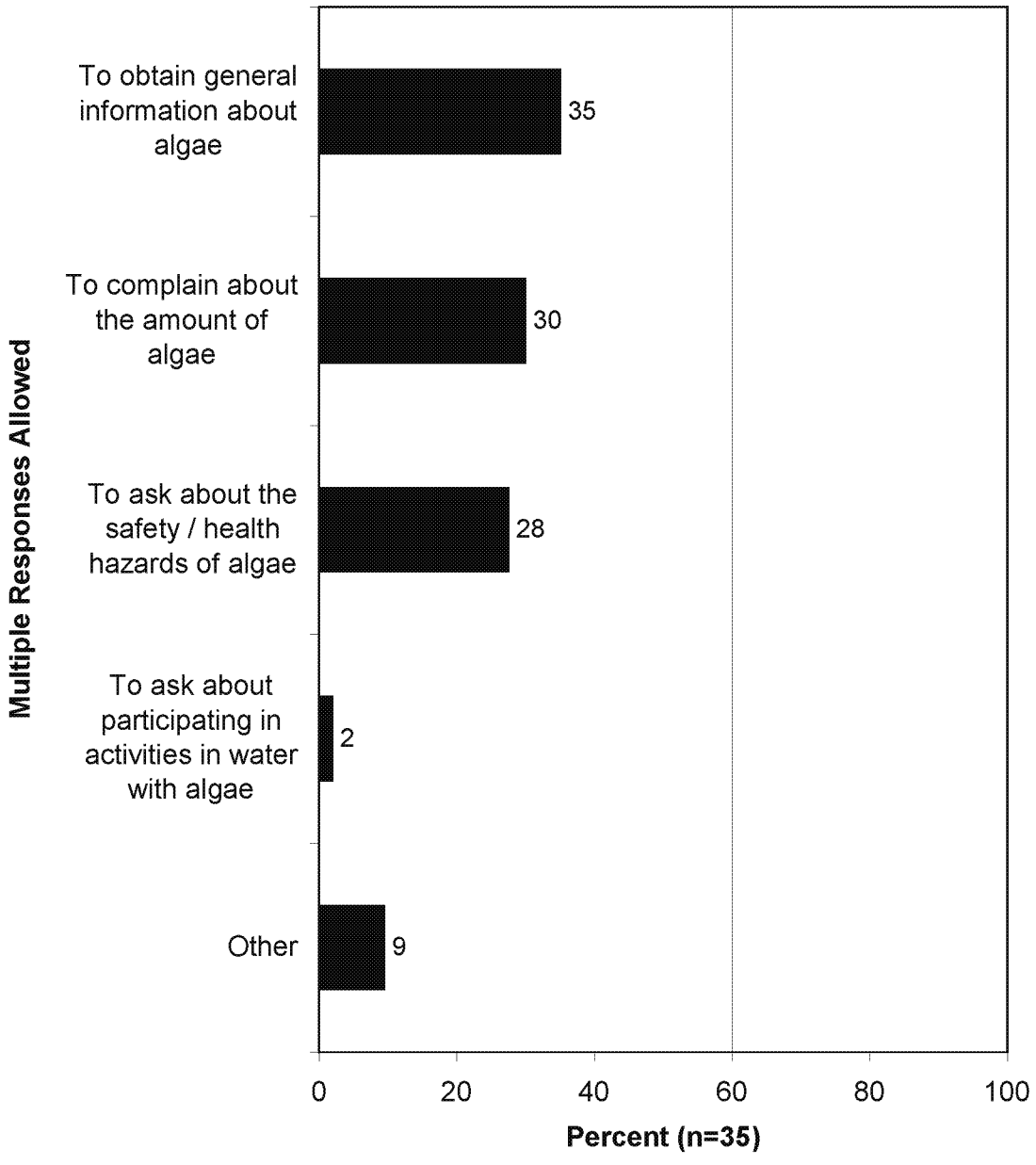
Q87. Have you contacted the DEP about algae in West Virginia waters in the past 2 years?



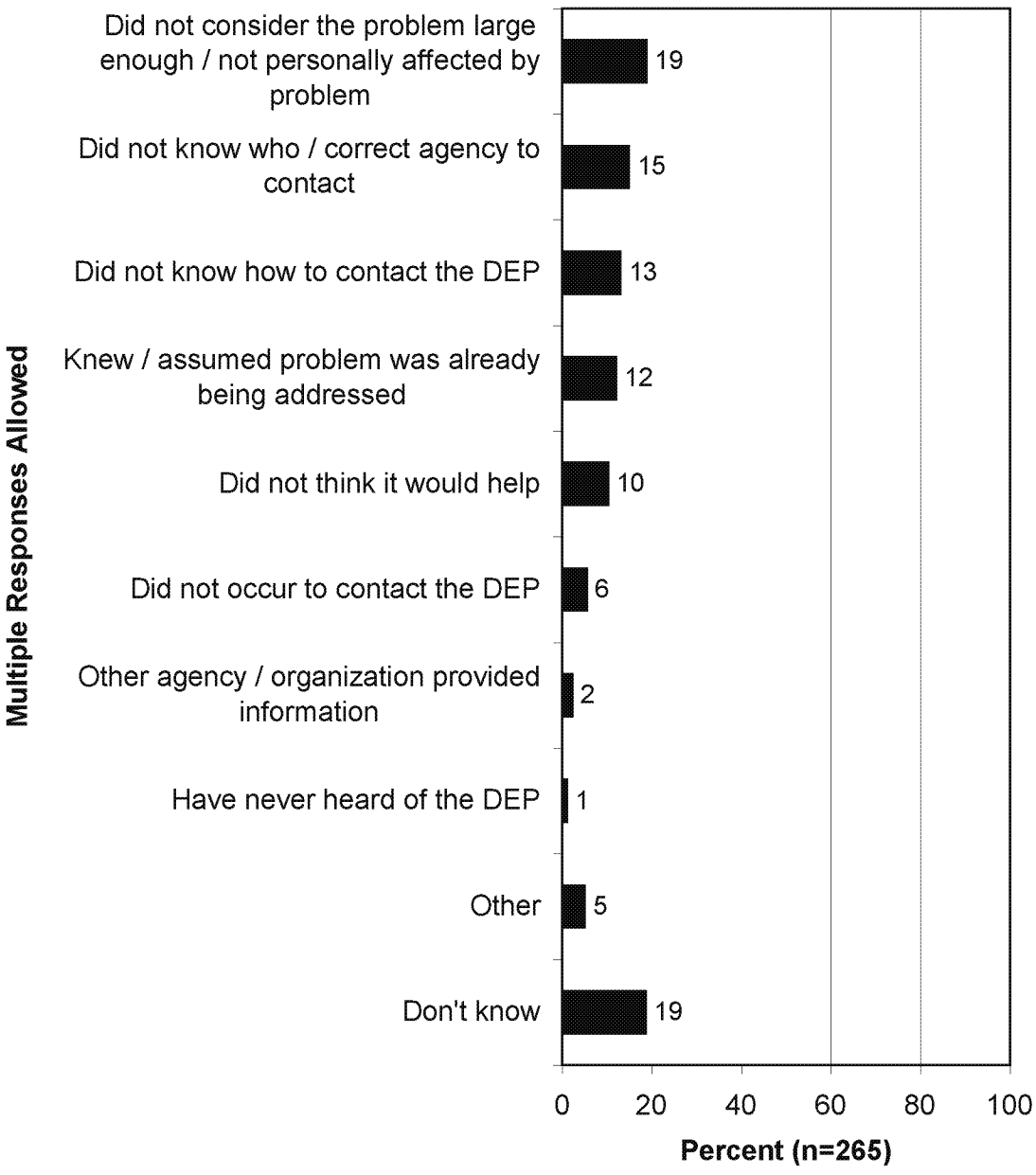
Q88. Have you contacted any other agency or organization about algae in West Virginia waters in the past 2 years?



Q91. What was your main reason for contacting an agency or organization about algae? (Asked of those who contacted the DEP or another agency or organization about algae in West Virginia waters in the past 2 years.)



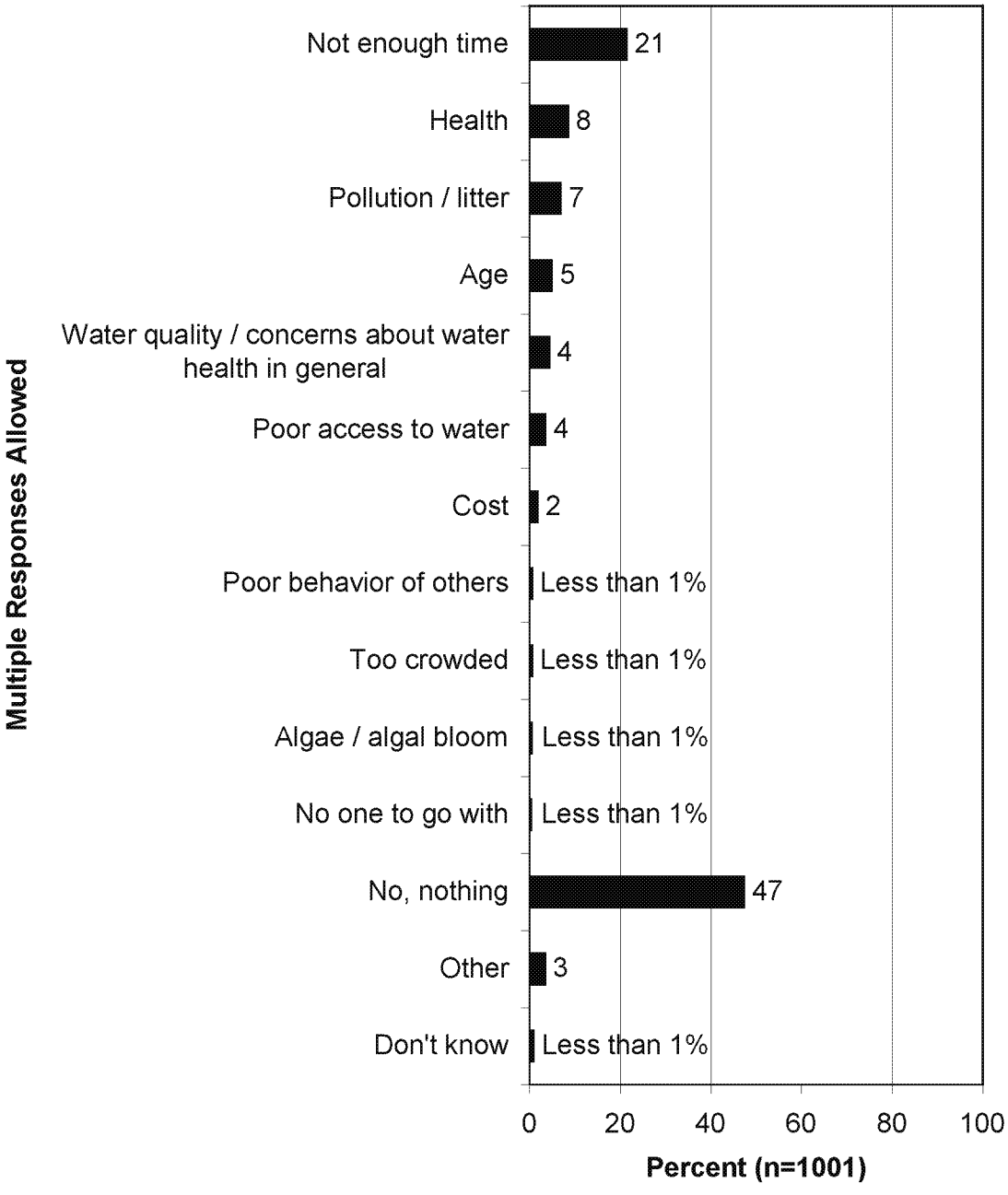
Q95. What was your main reason for NOT contacting the DEP about your concern regarding algae? (Asked of those who indicated being concerned about algae in West Virginia waters in the past 2 years but who did not contact the DEP about it.)



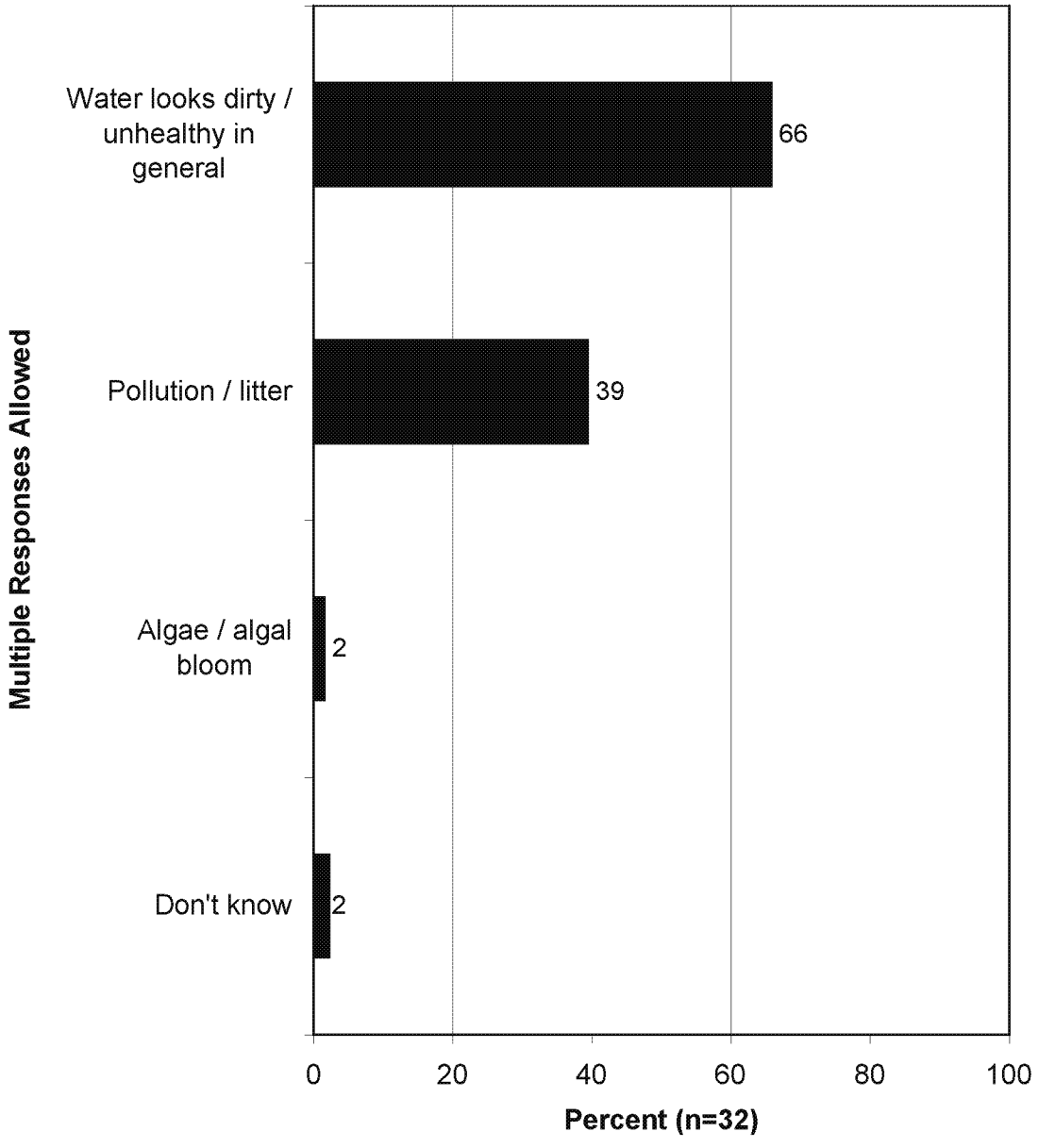
ALGAE-RELATED CONSTRAINTS TO PARTICIPATION IN WATER-BASED ACTIVITIES IN WEST VIRGINIA

- A general open-ended question asked respondents if there were things that took away from their participation in or their enjoyment of water-based recreation in West Virginia. Water quality was named by only 4%, and less than 1% named algae specifically. Those who answered "water quality" in this question were asked in follow-up to name the specific aspect of water quality that concerned them, and algae did not play much of a role in it, as shown in the graph.

Q36. In general, are there any things that take away from your participation in activities on or in West Virginia waters or cause you not to participate as much as you would like?



Q40. What are the main reasons you are concerned about water quality or water health in West Virginia? (Asked of those who indicated that water quality took away from their participation in activities on or in West Virginia waters.)

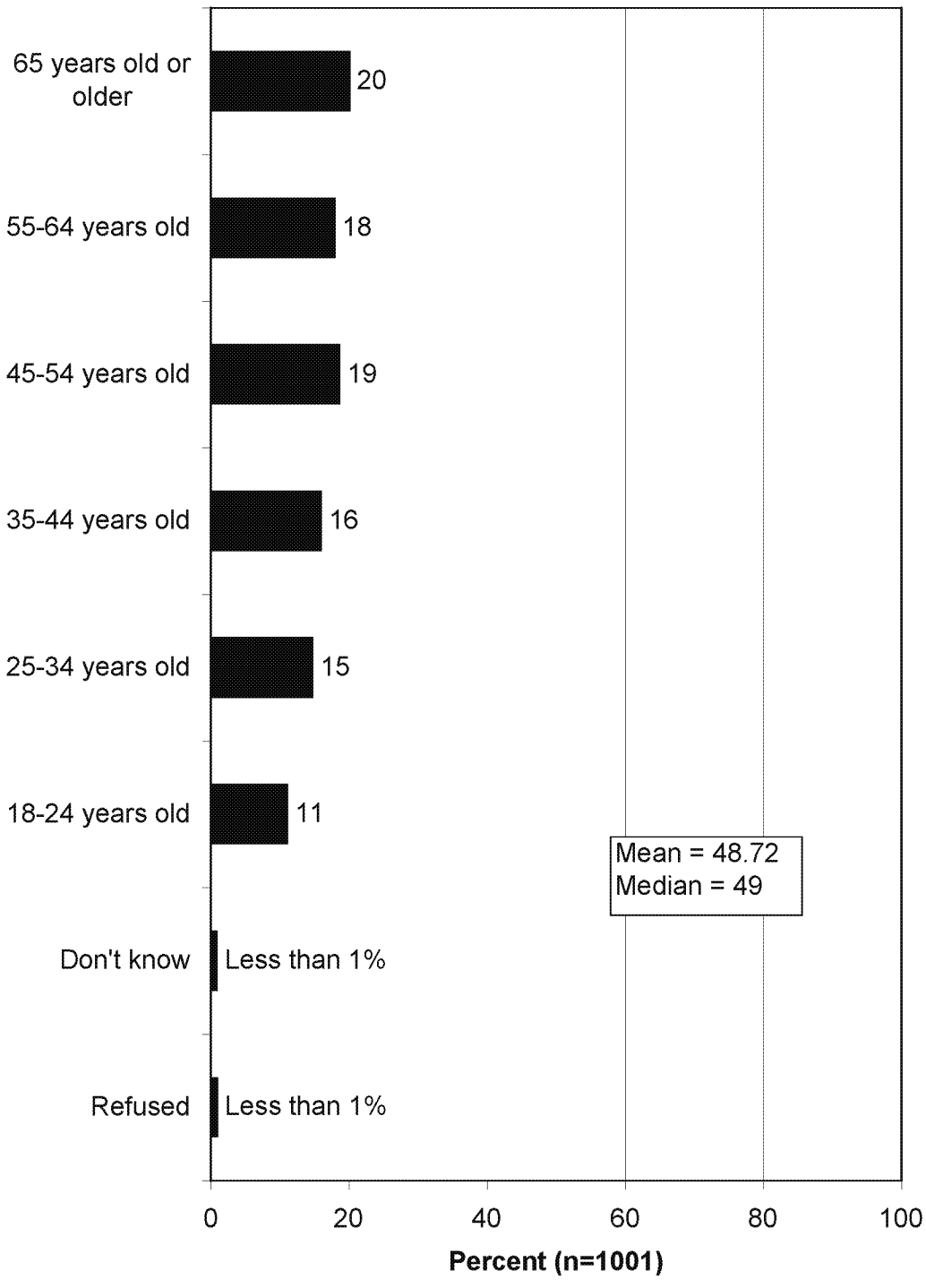


DEMOGRAPHIC DATA

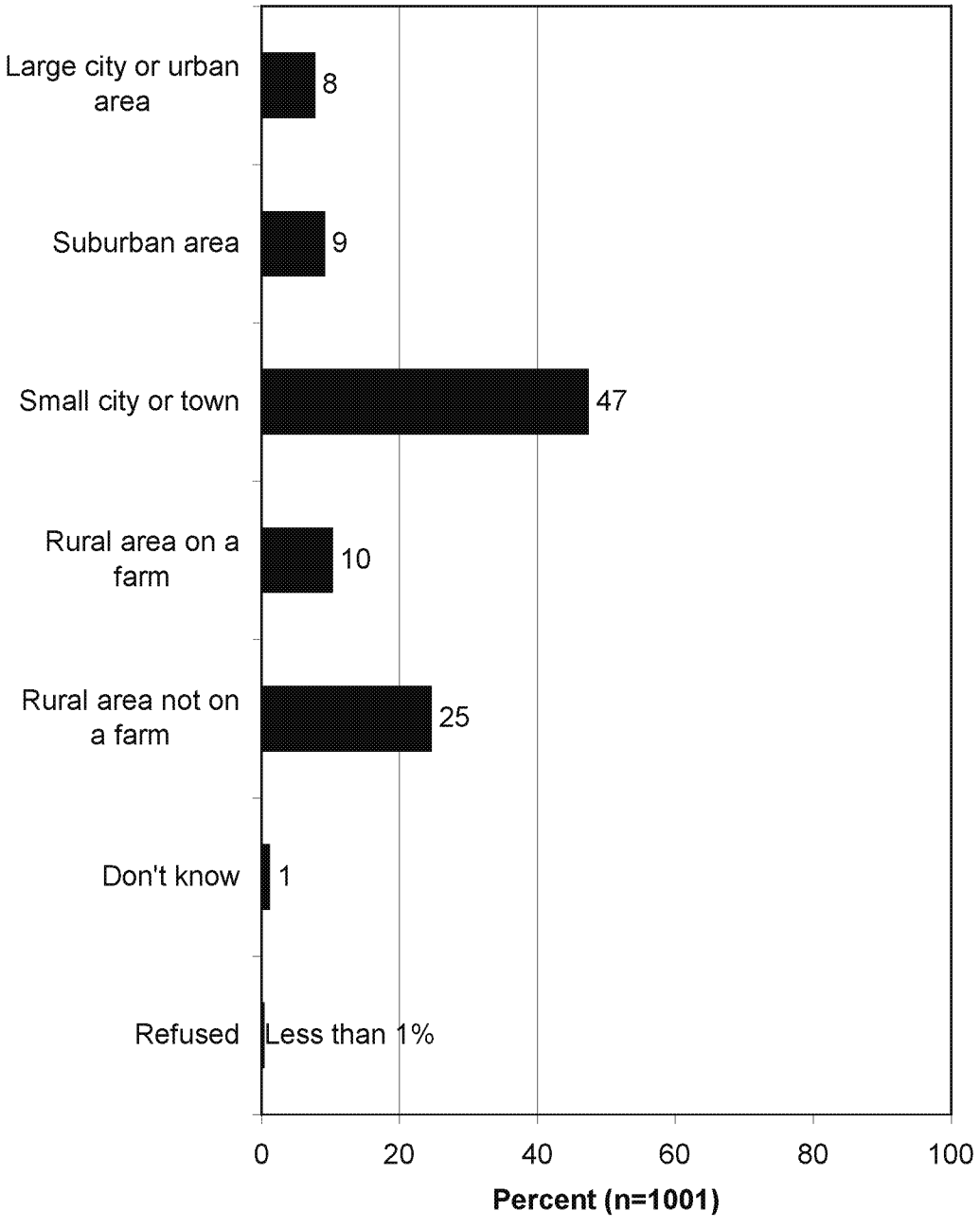
- Demographic data for the sample is shown.
  - Gender: the gender split, after weighting, exactly matches the U.S. Census data.
  - Age: the age breakdown, after weighting, exactly matches the U.S. Census data.
  - Residency: The breakdown by perceptions of residential character is shown.

Q109. Respondent's gender (not asked; observed by interviewer).

Q103. Respondent's age.



Q102. Do you consider your place of residence to be a large city or urban area, a suburban area, a small city or town, a rural area on a farm, or a rural area not on a farm?



IMPLICATIONS OF SURVEY RESULTS

PARTICIPATION IN WATER ACTIVITIES

Many West Virginia residents participate in water-based recreation, which means that there is likely to be wide exposure to algae issues. In particular, rivers and streams are commonly used, with somewhat less use being made of lakes/reservoirs, and much less use being made of ponds. The three rivers of interest (the Greenbrier, the South Branch of the Potomac, and the Cacapon, chosen for focus in the study because of the prevalence of algae issues on them) are widely used: about a third of water-based recreationists (32%) used one or more of these rivers for recreation.

KNOWLEDGE OF AND RATINGS OF THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Perceptions of credibility and trustworthiness of the DEP are positive, with only 4% saying that the DEP is *not at all* credible and 4% saying that the DEP is *not at all* trustworthy; however, the ratings are not uniformly positive, with substantial percentages saying that the DEP is *somewhat* credible (36%) or *somewhat* trustworthy (40%). Nonetheless, ratings of the DEP's efforts at protecting and restoring the environment are positive: 70% rate the efforts as excellent or good. Finally, in general, residents want the DEP to expend more effort on protecting and restoring the environment. In general, this suggests that the DEP will have credibility among residents regarding any communications relating to algae in West Virginia waters.

KNOWLEDGE AND AWARENESS OF ALGAE

In general, while West Virginia resident do not profess much knowledge of algae, they are aware of algae in West Virginia waters. About a third of residents (32%) think that algae has been increasing in West Virginia waters over the past 2 years. This perception of increasing algae levels is particularly strong among those who participate in water-based recreation on one of the three rivers of interest in this study (42% of those recreationists say that algae has been increasing over the past 2 years).

OPINIONS ON ALGAE IN GENERAL

General opinions of algae run from some mild concern ("Algae doesn't bother me, but I worry about problems it may cause") to more robust concern ("I generally regard algae as a nuisance"). When asked directly about whether algae is a problem in West Virginia, more than a third of residents indicate that algae is a problem. Furthermore, about a quarter indicate being concerned about algae in West Virginia waters.

A series of questions elicited opinions on various aspects of algae. Aesthetics plays a major role in feelings about algae, with 79% of West Virginia residents agreeing with the statement, "Algae is generally unattractive and unappealing." Safety also plays a role in opinions about algae, with well more than half of West Virginia residents (57%) agreeing that "algae causes safety hazards for people participating in activities on or in West Virginia waters." Those who participate in water-based recreation on the three rivers of interest have more negative opinions regarding algae, compared to those who do not engage in recreation on these rivers. The above should not be taken to mean that West Virginia residents misunderstand that some amount of algae in natural waters is part of a "normal" ecosystem. A large majority of residents (79%) agree that "algae is beneficial for the ecosystem in some situations."

LEVELS OF ACCEPTANCE OF ALGAE

The primary focus of the survey was to help determine the level of tolerance West Virginia residents have regarding algae in the state's natural waters. As discussed in the methodology, respondents examined photographs that showed varying levels of algae cover to determine at which point the level becomes unacceptable to them. The photograph that shows 20 percent coverage has only about a quarter of respondents (27%) thinking that this amount is unacceptable. However, the next photograph, showing 26 percent coverage, has nearly half of respondents (49%) thinking that the level is unacceptable. This suggests that waters with any more than a quarter coverage will be unacceptable to a majority of residents.

Crosstabulations of tolerance levels by participation in various activities and by demographic factors found that certain groups are less tolerant of algae than are other groups. In particular, people who go rafting or inner tubing, power boaters and users of personal watercraft, and those

who engage in walking along the banks and shores of natural waters are less tolerant of algae than are their counterparts. Demographically, those the median age or older have a lower tolerance of algae than do younger residents. Additionally, females have a lower tolerance of algae than do males.

CONTACTING AGENCIES AND ORGANIZATIONS REGARDING ALGAE

The substantial concern expressed about algae is not reflected in contacts with the DEP or other organizations about algae. The survey found that less than 1% of West Virginia residents contacted the DEP about algae in West Virginia waters in the past 2 years, and a little less than 3% contacted any other agency or organization about algae.

ALGAE-RELATED CONSTRAINTS TO PARTICIPATION IN WATER-BASED ACTIVITIES IN WEST VIRGINIA

At present, algae is not a major constraint to water-based recreation in the state. A general open-ended question asked respondents if there were things that took away from their participation in or their enjoyment of water-based recreation in West Virginia, and water quality was named by only 4%, and less than 1% named algae specifically. Nonetheless, if algae levels increase, the data suggest that water-based recreation could be affected. This would be particularly true if algae levels routinely reach more than about a quarter coverage in rivers and streams.

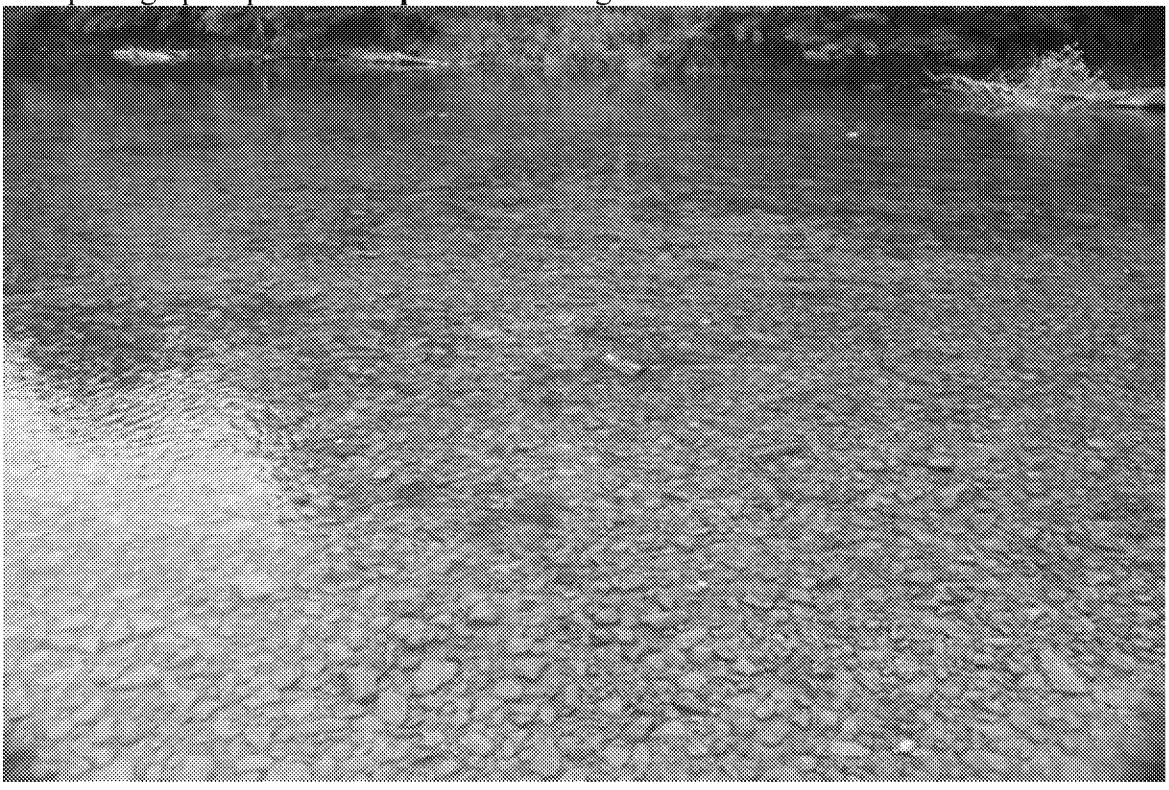
APPENDIX A: IMAGES

These algae coverage images were used in the survey (the "ruse" photographs are not shown).

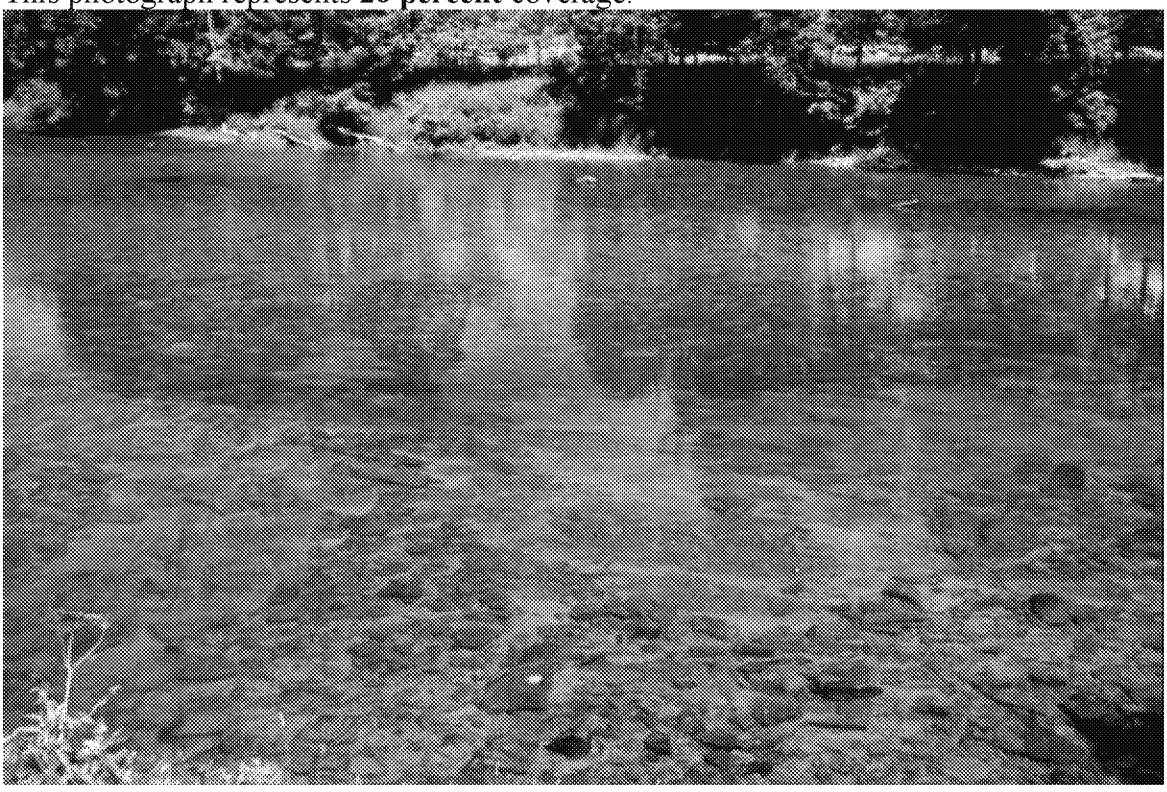
This photograph represents **4 percent** coverage.

This photograph represents **15 percent** coverage.

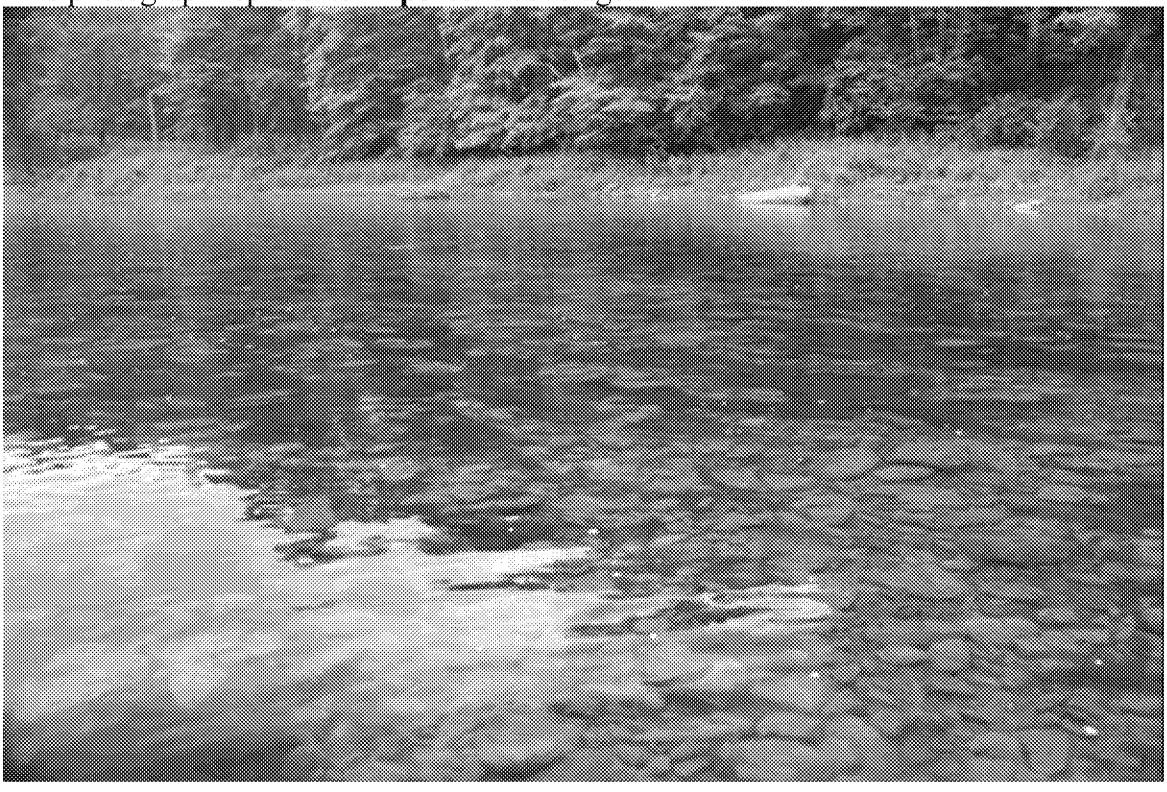
This photograph represents **20 percent** coverage.



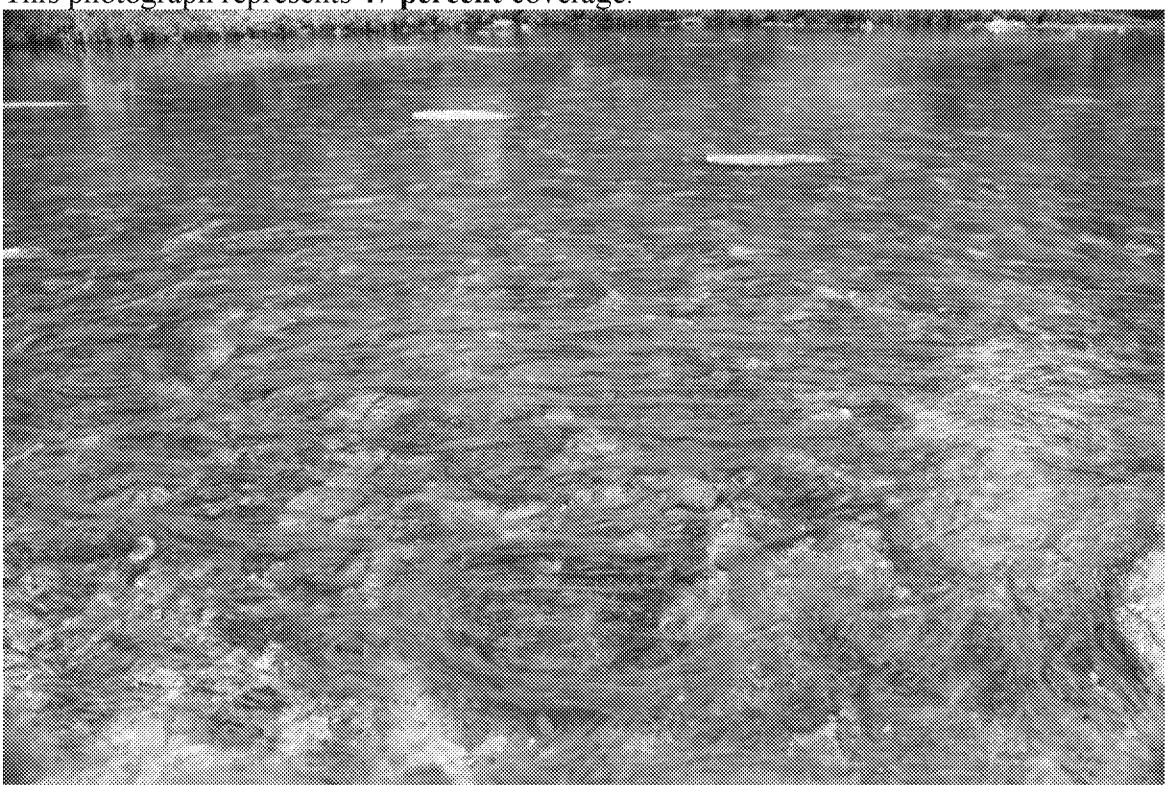
This photograph represents **26 percent** coverage.



This photograph represents **39 percent** coverage.



This photograph represents **47 percent** coverage.



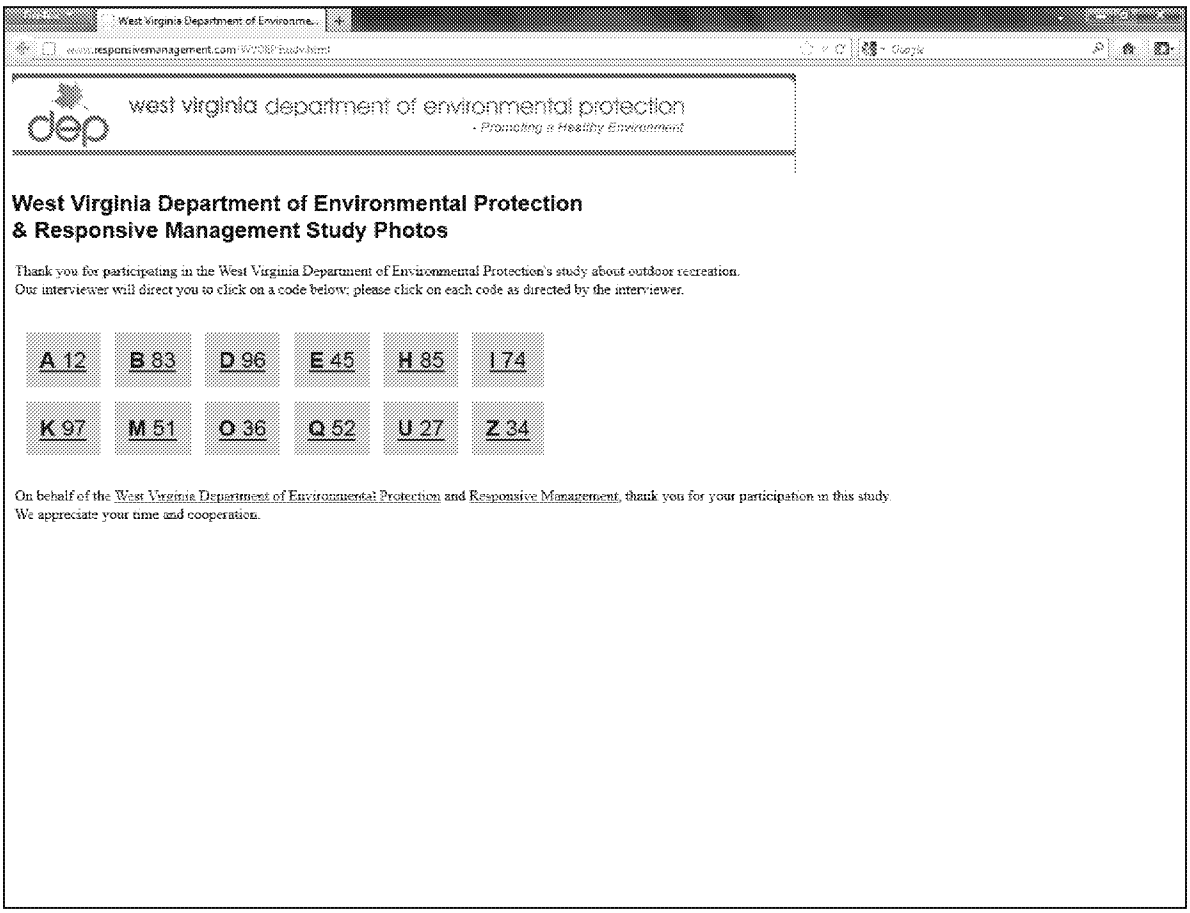
This photograph represents **65 percent** coverage.

APPENDIX B: IMAGE WEBSITE

The images were located on the web page at the address listed below; a screen shot of the web page is included. This web page will be left active for several months after the publication of the report for online viewing by interested readers. The alphanumeric code was meant to suggest a randomness to the viewers, thereby hiding the fact that the images include water photographs with algae coverage ranging from 4 percent to 65 percent.

In reality, the alphanumeric code can be used to view the photographs in order of increasing algae coverage. All photographs identified by a code starting with a vowel are ruse photographs and can be ignored. For those codes that start with a consonant, the last digit represents the rank order from least to most algae coverage. The photographs of algae, in order of increasing coverage, are M51, Q52, B83, Z34, H85, D96, and K97.

http://www.responsivemanagement.com/WVDEPStudy.html



ABOUT RESPONSIVE MANAGEMENT

Responsive Management is an internationally recognized public opinion and attitude survey research firm specializing in natural resource and outdoor recreation issues. Our mission is to help natural resource and outdoor recreation agencies and organizations better understand and work with their constituents, customers, and the public.

Utilizing our in-house, full-service telephone, mail, and web-based survey center with 50 professional interviewers, we have conducted more than 1,000 telephone surveys, mail surveys, personal interviews, and focus groups, as well as numerous marketing and communication plans, needs assessments, and program evaluations.

Clients include the federal natural resource and land management agencies, most state fish and wildlife agencies, state departments of natural resources, environmental protection agencies, state park agencies, tourism boards, most of the major conservation and sportsmen's organizations, and numerous private businesses. Responsive Management also collects attitude and opinion data for many of the nation's top universities.

Specializing in research on public attitudes toward natural resource and outdoor recreation issues, Responsive Management has completed a wide range of projects during the past 20 years, including dozens of studies of hunters, anglers, wildlife viewers, boaters, park visitors, historic site visitors, hikers, birdwatchers, campers, and rock climbers. Responsive Management has conducted studies on endangered species; waterfowl and wetlands; and the reintroduction of large predators such as wolves, grizzly bears, and the Florida panther.

Responsive Management has assisted with research on numerous natural resource ballot initiatives and referenda and has helped agencies and organizations find alternative funding and increase their membership and donations. Additionally, Responsive Management has conducted major organizational and programmatic needs assessments to assist natural resource agencies and organizations in developing more effective programs based on a solid foundation of fact.

Responsive Management has conducted research on public attitudes toward natural resources and outdoor recreation in almost every state in the United States, as well as in Canada, Australia, the United Kingdom, France, Germany, and Japan. Responsive Management has also conducted focus groups and personal interviews with residents of the African countries of Algeria, Cameroon, Mauritius, Namibia, South Africa, Tanzania, Zambia, and Zimbabwe.

Responsive Management routinely conducts surveys in Spanish and has conducted surveys in Chinese, Korean, Japanese and Vietnamese and has completed numerous studies with specific target audiences, including Hispanics, African-Americans, Asians, women, children, senior citizens, urban, suburban and rural residents, large landowners, and farmers.

Responsive Management's research has been upheld in U.S. District Courts; used in peer-reviewed journals; and presented at major natural resource, fish and wildlife, and outdoor recreation conferences across the world. Company research has been featured in most of the nation's major media, including CNN, *The New York Times*, *The Wall Street Journal*, and on the front pages of *USA Today* and *The Washington Post*. Responsive Management's research has also been highlighted in *Newsweek* magazine.

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